

RESULTS OF THE ARCHBOLD
EXPEDITIONS. NO. 65

THE RODENTS OF AUSTRALIA
AND NEW GUINEA

G. H. H. TATE

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OF THE
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INTRODUCTION

THE RODENTS OF Australia and New Guinea, though they form an important and extensive element in the mammalian fauna of those regions, have received far less attention than the marsupials. This relative neglect is understandable on account of the much greater interest aroused by the morphology and biology of the marsupials, by their superior rank as a subphylum, and by their uniqueness among the mammals. On the contrary, the rodents found in Australia form only a part of a family, and comparable types can be seen and studied elsewhere. It can be shown, however, that in their own small way the rodents, upon arrival in Australia, largely followed the opportunities and examples of the marsupials, adapting themselves and expanding their ranges so as to fill many of the available environmental niches.

While the colonization tracks used by the marsupials are likely to remain shrouded in the remote past, there is reason, founded on their varied stages of adaptation and their present distributional patterns, to believe that the rodents entered Australia and New Guinea from Malaysia in several or many waves and by various routes.

In the present paper I have tried to make as complete a survey as is now possible of the New Guinea and Australian rodents. As I have been privileged to study the type specimens of most of the known species, I have laid particular emphasis on the characters shown by those types. For this I make no apology, since many of them have been imperfectly made known, and the skulls of some, recorded earlier (Tate, 1940), have never before been described. Also, an advantage is obtained from redescrptions of races and species when others closely allied have been available for examination and comparison at the same time.

Thomas (1921a) published a list of "lectotypes" of the Australian Muridae. He did not always distinguish between real lectotypes (single individuals selected from the specimens studied by the describer) and neotypes. I have accepted the former and tried to avoid the latter.

Besides dealing serially with the genera,

species, and subspecies of the Australian region, I have made comparative anatomical studies of certain of the external structures, the teeth, and some of the bones of the skull. As a result I have been able to postulate (with reservations) the phylogenies of some of the generic groups, taking into consideration the geological and climatic history of the Australian region, so far as known. Though few decisive conclusions regarding relationships have been reached on a generic level, the relationships of many of the species and races have become clearer.

In course of the long period of preparation for writing this paper I have become indebted to the many friends and associates, both private individuals and members of the staffs of institutions, whose names appear below:

Dr. Seth B. Benson, Curator of Mammals, Museum of Vertebrate Zoology, Berkeley, California, for the loan of *Rattus* from the Solomon Islands.

Dr. David Johnson, Curator of Mammals, the United States National Museum, for the loan of material.

Miss Barbara Lawrence, Curator of Mammals, Museum of Comparative Zoölogy, for the loan of material.

Mr. George Mack, Director of the Queensland Museum, Brisbane, and his assistant, Mr. Don Vernon, for information on *Hydromys*.

Dr. Carl Mohr, who sent in various mammals from New Guinea while on military service.

Mr. T. C. S. Morrison-Scott, Curator of Mammals, British Museum (South Kensington), for kindly checking numerous points of rodent structure for me at various times and for lending me specimens of *Melomys fellowsi*.

Dr. Colin C. Sanborn, Curator of Mammals, Chicago Natural History Museum, for the loan of material.

Mr. Ellis LeG. Troughton, Curator of Mammals, the Australian Museum, Sydney, for much valuable information and for the loan of a specimen of *Xeromys myoides*.

The curators of collections in various parts of the world who in 1937 allowed me to study and photograph the type specimens and others in their charge.

The primary items on which this report is founded are: (1) my collection of photographs of, and notes on, the types of the rodents of the Australian region which are

safeguarded in various of the world's museums; (2) the very large and really unrivalled series of specimens contained in the Archbold collections at the American Museum of Natural History; (3) the excellent collections in many other museums from which it has been possible to supplement our own collections and fill in most of the inevitably present gaps. Unless otherwise specified, all specimens in the lists of material are in the Archbold collection.

The following are new forms described in this paper: *Pseudohydromys occidentalis*, *Pseudomys* (*Gyomys*) *occidentalis*, *Pogonomys kagi*, *Melomys albidens*, *Melomys cervinipes bunya*, *Melomys cervinipes capensis*, *Melomys moncktoni sturti*, *Melomys lutillus frigidicola*, *Melomys rufescens niviventer*, *Rattus leucopus mcilwraithi*, *Rattus leucopus cooktownensis*, and *Rattus lacus*.

Where descriptions of colors are capitalized, they indicate the names of Ridgway (1912).

Brackets around the name of a geographical race in the systematic section of this paper show that its validity is questioned.

The following contractions are used to signify the name of institutions:

A.M.N.H., the American Museum of Natural History

B.M., British Museum (Natural History)

C.N.H.M., Chicago Natural History Museum

M.C.Z., Museum of Comparative Zoölogy

U.S.N.M., United States National Museum

Measurements have been grouped in a single extensive table (table 5) at the end of the systematic treatment (p. 353 and following). The measurements of types and

cotypes, excluding those of forms newly described in this paper, have been given as completely as the often aged or broken specimens permitted, and if available those of supplemental topotypes have also been included. The external measurements are as a rule reasonably reliable, though a considerable degree of variability shows in the taking of the tail length, and the head and body may have become stretched and measured afterward. Ear measurements can be made in so many ways that they are to be considered almost wholly unreliable for purposes of comparison. The collectors of the recent Archbold expedition took the ear measurement from the crown of the head to the tip of the ear pinna. Other workers have often measured from the "notch."

I have made almost all the cranial measurements shown in the tables myself from the type skulls. The palatal length is taken from the front of the palate just anterior to the incisors to the back, excluding any sharply pointed spine. The length of the bulla omits the Eustachian portion; it is a slightly subjective dimension. The length of the molar tooth row includes the "bodies" of the molars. Projecting roots are not included. The lengths of individual molars are measured along the labial faces of the teeth. Ideally, they should add up to the total of m^1-3 , but they do not always do so.

The following is a list of all the species and races discussed. The type specimens of most have been either photographed or studied or both. All but about 30 of the approximately 330 named forms have been photographed.

	PHOTO- GRAPHED AND STUDIED	STUDIED, NOT PHOTO- GRAPHED	MUSEUM NUMBER
<i>Leptomys elegans</i>	Type		Genoa, no number
<i>Leptomys ernstmayri</i>	Type		Berlin, 42400
<i>Leptomys signatus</i>		Type	A.M.N.H. 105792
<i>Paraleptomys wilhelmina</i>		Type	A.M.N.H. 151512
<i>Paraleptomys rufilatus</i>		Type	C.N.H.M. 54236
<i>Pseudohydromys murinus</i>	Type		M.C.Z. 29904
<i>Pseudohydromys occidentalis</i>		Type	A.M.N.H. 150772
<i>Microhydromys richardsoni</i>		Type	A.M.N.H. 152079
<i>Xeromys myoides</i>	Type		B.M. 87.10.31.2
<i>Xeromys myoides</i>			Sydney, M.6868
<i>Baiyankamys shawmayeri</i>		Type	B.M. (field) 713
<i>Parahydromys asper</i>	Type		B.M. 99.4.4.1
<i>Hydromys habbema</i>		Type	A.M.N.H. 110055
<i>Hydromys chrysogaster</i>			Paris, 781 (skin only)
<i>Hydromys leucogaster</i>			Paris (not found)
<i>Hydromys fulvolavatus</i>	Cotype		B.M. 56.10.28.14
<i>Hydromys fuliginosus</i>	Lectotype		B.M. 56.10.28.15
<i>Hydromys reginae</i>	Type		B.M. 8.8.8.23
<i>Hydromys lawnensis</i>	Type		Sydney, N.5650
<i>Hydromys beccarii</i>	Cotype		Berlin, 4805
<i>Hydromys beccarii</i>	Cotype		Genoa, C.E. 3637
<i>Hydromys esox</i>	Type		B.M. 6.1.26.1
<i>Hydromys caurinus</i>			B.M. (field) 34 (not seen)
<i>Hydromys nauticus</i>	Type		B.M. 10.3.2.14
<i>Hydromys melicertes</i>	Type		B.M. 13.6.28.37
<i>Hydromys longmani</i>	Type		B.M. 22.12.18.2
<i>Hydromys grootensis</i>	Type		Sydney, M.4476
<i>Hydromys moae</i>	Type		Sydney, M.4558
<i>Hydromys illuteus</i>	Type		B.M. 22.2.2.61
<i>Hydromys oriens</i>	Type		Sydney, M.4683
<i>Hydromys neobritannicus</i>		Type	A.M.N.H. 99867
<i>Crossomys moncktoni</i>	Type		B.M. 7.5.22.3
<i>Pseudomys (Pseudomys) australis</i>	Type		B.M. 232A
<i>Pseudomys (Pseudomys) murinus</i>	Type		B.M. 53.10.22.4
<i>Pseudomys (Pseudomys) minnie</i>	Type		Sydney, M.5195
<i>Pseudomys (Pseudomys) flavescens</i>	Type		Sydney, M.6004
<i>Pseudomys (Pseudomys) lineolatus</i>	Cotype		B.M. 57.10.26.1
<i>Pseudomys (Pseudomys) lineolatus</i>	Cotype		B.M. 58.11.24.4
<i>Pseudomys (Pseudomys) oralis</i>	Type		B.M. 47.1.20.2
<i>Pseudomys (Pseudomys) shortridgei</i>	Type		B.M. 6.8.1.73
<i>Pseudomys (Pseudomys) rawlinnae</i>	Type		Sydney, M.4642
<i>Pseudomys (Pseudomys) auritus</i>	Type		B.M. 53.10.22.6
<i>Pseudomys (Pseudomys) higginsii</i>			(Type not in existence)
<i>Pseudomys (Gyomys) novaehollandiae</i>	Type		B.M. 43.2.24.1
<i>Pseudomys (Gyomys) pumilus</i>	Type		Sydney, M.6032
<i>Pseudomys (Gyomys) apodemoides</i>		Type	Adelaide, M.3466
<i>Pseudomys (Gyomys) glaucus</i>	Type		B.M. 92.8.7.2
<i>Pseudomys (Gyomys) squalorum</i>	Type		B.M. 6.10.5.6
<i>Pseudomys (Gyomys) albocinereus</i>	Type		B.M. 44.7.9.16
<i>Pseudomys (Gyomys) berneyi</i>	Type		Sydney, M.6000
<i>Pseudomys (Gyomys) fumeus</i>	Type		Melbourne, C.197
<i>Pseudomys (Gyomys) occidentalis</i>		Type	C.N.H.M. 34725
<i>Pseudomys (Gyomys) desertor</i>			Sydney, M.1306 (not seen)
<i>Pseudomys (Thetomys) nanus</i>	Cotype		B.M. 44.9.30.10

	PHOTO- GRAPHED AND STUDIED	STUDIED, NOT PHOTO- GRAPHED	MUSEUM NUMBER
<i>Pseudomys (Thetomys) nanus</i>	Cotype		B.M. 44.9.30.11
<i>Pseudomys (Thetomys) ferculinus</i>	Type		B.M. 2.10.10.7
<i>Pseudomys (Thetomys) praeconis</i>	Type		B.M. 58.12.27.14
<i>Pseudomys (Thetomys) fieldi</i>	Type		Sydney
<i>Pseudomys (Thetomys) gracilicaudatus</i>	Type		B.M. 58.11.20.3
<i>Pseudomys (Thetomys) ultra</i>	Type		Sydney, M.6407
<i>Pseudomys (Thetomys) gouldii</i>	Cotype		B.M. 55.12.24.149
<i>Pseudomys (Thetomys) gouldii</i>		Cotype	B.M. 55.12.24.148
<i>Leggadina forrestii</i>	Type		B.M. 6.3.9.39
<i>Leggadina waitei</i>	Type		Sydney, M.5194
<i>Leggadina messoria</i>	Type		B.M. 25.4.9.1
<i>Leggadina delicatula</i>	Cotypes		B.M. 42.5.26.17-18
<i>Leggadina mimula</i>	Type		B.M. 26.3.11.174
<i>Leggadina patria</i>	Type		B.M. 7.8.9.44
<i>Leggadina hermannsburgensis</i>	Paratype		B.M. 97.1.8.2
<i>Leggadina hermannsburgensis</i>		Paratypes	B.M. 97.1.8.1, 97.1.8.3
<i>Leggadina bolami</i>			Sydney, M.4938 (not seen)
<i>Leggadina bolami</i>		Topotypes	A.M.N.H. 107401-2
<i>Leggadina bolami</i>		Typotype	M.C.Z. 27998
<i>Leggadina brazenori</i>			Melbourne (not seen)
<i>Lorentzimys nouhuysii</i>	Type		Leiden, (field) 319
<i>Lorentzimys alticola</i>		Type	A.M.N.H. 150592
<i>Leporillus apicalis</i>	Cotype		B.M. 53.10.22.15
<i>Leporillus apicalis</i>		Cotype	B.M. 53.10.22.14
<i>Leporillus conditor</i>			(Not found)
<i>Leporillus jonesi</i>	Type		B.M. 21.7.3.2
<i>Mastacomys fuscus</i>	Type		B.M. 52.1.15.15
<i>Mastacomys mordicus</i>	Type		B.M. 22.10.1.3
<i>Notomys mitchellii</i>			Sydney ("cotypes") (not seen)
<i>Notomys macropus</i>	Type		B.M. 55.12.24.361
<i>Notomys alutacea</i>	Type		Melbourne, C.38
<i>Notomys gouldii</i>	Type		B.M. 7.1.1.135
<i>Notomys alexis</i>	Type		B.M. 6.3.9.65
<i>Notomys reginae</i>			Brisbane, (field) 54 (not seen)
<i>Notomys everardensis</i>			Adelaide, M.3685, M.3673 (not seen)
<i>Notomys richardsoni</i>	Type		B.M. 43.8.21.3
<i>Notomys aquilo</i>	Type		B.M. 67.9.17.2
<i>Notomys aistoni</i>	Type		Melbourne, R.13740
<i>Notomys cervinus</i>	Type		B.M. 53.10.22.7
<i>Notomys fuscus</i>			(Type not designated)
<i>Notomys sturti</i>	Type		B.M. 46.5.14.40
<i>Notomys megalotis</i>	Type		B.M. 44.7.9.14
<i>Notomys mordax</i>	Type		B.M. 46.4.4.65
<i>Notomys longicaudatus</i>	Type		B.M. 44.10.15.3
<i>Notomys amplus</i>	Type		Melbourne, C.512
<i>Zyzomys argurus</i>	Type		B.M. 86.8.26.6
<i>Zyzomys indutus</i>	Type		B.M. 9.4.23.3
<i>Laomys pedunculatus</i>	Type		B.M. 97.1.8.5
<i>Laomys woodwardi</i>	Type		B.M. 9.2.16.3
<i>Mesembriomys gouldii</i>	Type		B.M. 42.5.26.18
<i>Mesembriomys melvillensis</i>	Type		B.M. 35.11.30.1
<i>Mesembriomys rattoides</i>	Type		B.M. 1.3.4.1
<i>Mesembriomys macrurus</i>			(Not found)
<i>Mesembriomys boweri</i>			Sydney, M.1350 (not seen)

	PHOTO- GRAPHED AND STUDIED	STUDIED, NOT PHOTO- GRAPHED	MUSEUM NUMBER
<i>Mesembriomys boweri</i>	(Not a type)		B.M. 4.1.3.17
<i>Conilurus albipes</i>			(Type probably non-existent)
<i>Conilurus constructor</i>			B.M. 63.6.20.1 (skin only)
<i>Conilurus constructor</i>	(Not a type)		B.M. 42.6.29.6
<i>Conilurus penicillatus</i>	Type		B.M. 42.5.26.13
<i>Conilurus hemileucurus</i>	Type		B.M. 57.10.24.17
<i>Conilurus melibius</i>	Type		B.M. 13.6.28.36
<i>Conilurus randi</i>		Type	A.M.N.H. 105636
<i>Mus albertisii</i>	Cotype		Berlin, 5423
<i>Mus albertisii</i>	Cotype		Genoa, C.E.3474
<i>Mallomys rothschildi</i>	Type		B.M. 97.12.6.6
<i>Mallomys aroaensis</i>	Type		Brisbane, J.16-2814
<i>Mallomys weylandi</i>	Type		Tring (field) 95
<i>Mallomys argentata</i>	Cotype		B.M. 33.6.1.33
<i>Mallomys hercules</i>	Type		B.M. 12.1.31.1
<i>Hyomys goliath</i>	Type		Paris, 1066A
<i>Hyomys meeki</i>	Type		B.M. 3.12.1.12
<i>Hyomys dammermani</i>	Type		Berlin, 44408
<i>Hyomys strobilurus</i>			Berlin, 34356 (skin only)
<i>Macruromys elegans</i>	Type		Berlin, 44393
<i>Macruromys major</i>	Type		B.M. (field) 317
<i>Anisomys imitator</i>	Type		B.M. 3.12.1.10
<i>Pogonomys sylvestris</i>	Type		B.M. 11.10.13.6
<i>Pogonomys macrourus</i>	Type		Paris, 1877-1473
<i>Pogonomys lepidus</i>	Cotype		B.M. 97.8.7.51
<i>Pogonomys huon</i>		Type	A.M.N.H. 79763
<i>Pogonomys derimapa</i>		Type	A.M.N.H. 101963
<i>Pogonomys mollipilosus</i>	Type		Genoa, C.E.3491
<i>Pogonomys loriae</i>	Cotype		B.M. 97.8.7.47
<i>Pogonomys loriae</i>	Topotype		Genoa, C.E.3492
<i>Pogonomys dryas</i>	Type		B.M. 4.4.10.6
<i>Pogonomys forbesi</i>	Type		B.M. 88.3.16.2
<i>Pogonomys pulcher</i>	Type		B.M. 95.5.8.5
<i>Pogonomys vulturinus</i>	Type		B.M. 97.8.7.14
<i>Pogonomys mambatus</i>	Type		B.M. 7.2.1.10
<i>Pogonomys satisfactus</i>		Type	A.M.N.H. 79828
<i>Pogonomys major</i>		Type	A.M.N.H. 79831
<i>Pogonomys lamia</i>	Cotype		B.M. 97.8.7.65
<i>Pogonomys kagi</i>		Type	A.M.N.H. 108458
<i>Pogonomys vates</i>	Type		B.M. 8.10.8.7
<i>Xenuromys barbatus</i>	Type		Paris, 1900-398/1066B
<i>Xenuromys guba</i>		Type	A.M.N.H. 152043
<i>Melomys albidens</i>		Type	A.M.N.H. 150821
<i>Melomys fellowsi</i>			B.M. (field) 695
<i>Melomys fellowsi</i>		2 para- types	
<i>Melomys lorentzii</i>	Type		Leiden, (field) 132
<i>Melomys lanosus</i>	Type		B.M. 22.2.22.26
<i>Melomys rattoides</i>	Type		B.M. 22.2.2.25
<i>Melomys shawmayeri</i>	Type		B.M. (field) 368
<i>Melomys levipes</i>	Cotype		B.M. 97.8.7.72
<i>Melomys meeki</i>	Type		B.M. 5.11.28.19
<i>Melomys stevensi</i>		Type	M.C.Z. 29890
<i>Melomys mollis</i>	Type		B.M. 13.6.18.35
<i>Melomys naso</i>	Type		B.M. 11.11.11.54

	PHOTO- GRAPHED AND STUDIED	STUDIED, NOT PHOTO- GRAPHED	MUSEUM NUMBER
<i>Melomys clarae</i>	Type		Berlin, 45673
<i>Melomys weylandi</i>	Type		Berlin, 45672
<i>Melomys arfakianus</i>	Type		B.M. 29.5.27.40
<i>Melomys aereus</i>	Type		B.M. 20.7.26.4
<i>Melomys cervinipes</i>	Cotype		B.M. 53.10.22.11
<i>Melomys cervinipes</i>	"Lectotype"		B.M. 52.12.15.1
<i>Melomys bunya</i>		Type	A.M.N.H. 162618
<i>Melomys eboreus</i>	Type		B.M. 22.12.18.11
<i>Melomys pallidus</i>			Sydney, M.4379 (not seen)
<i>Melomys banfieldi</i>			Sydney (not seen)
<i>Melomys banfieldi</i>	Topotype		B.M. 21.1.16.2
<i>Melomys limicauda</i>	Type		Sydney, M.5928
<i>Melomys melicus</i>	Type		B.M. 13.6.28.32
<i>Melomys albiventer</i>		Type	U.S.N.M. 237782
<i>Melomys capensis</i>		Type	A.M.N.H. 154198
<i>Melomys moncktoni</i>	Type		B.M. 4.8.3.4
<i>Melomys sturti</i>		Type	A.M.N.H. 105425
<i>Melomys intermedius</i>	Type		B.M. 13.6.18.42
<i>Melomys sharwi</i>		Type	A.M.N.H. 101959
<i>Melomys obiensis</i>	Type		B.M. 3.4.10.1
<i>Melomys platyops</i>	Type		B.M. 5.11.28.18
<i>Melomys fuscus</i>	Type		B.M. 22.2.2.28
<i>Melomys mamberanus</i>	Type		Amsterdam, (field) 28
<i>Melomys arfakiensis</i>	Type		B.M. 29.5.27.28
<i>Melomys jobiensis</i>	Type		Berlin, 45675
<i>Melomys alleni</i>		Type	M.C.Z. 29902
<i>Melomys tafa</i>		Type	A.M.N.H. 104340
<i>Melomys clarus</i>	Type		B.M. (field) 364
<i>Melomys stresemanni</i>	Type		Berlin, 45671
<i>Melomys pohlei</i>	Type		Berlin, 38738
<i>Melomys rubex</i>	Type		B.M. 22.2.2.44
<i>Melomys steini</i>	Type		Berlin, 45674
<i>Melomys rutilus</i>	Type		B.M. 13.6.18.36
<i>Melomys lutillus</i>	Type		B.M. 5.11.28.20
<i>Melomys muscalis</i>	Type		B.M. 86.5.16.4
<i>Melomys froggatti</i>	Type		Sydney, M.2377
<i>Melomys murinus</i>	Type		B.M. 99.9.10.3
<i>Melomys australis</i>	Type		B.M. 15.3.5.51
<i>Melomys mixtus</i>	Type		Sydney, M.5397
<i>Melomys littoralis</i>	Type		Stockholm, 44
<i>Melomys insulae</i>	Type		Sydney, M.4382
<i>Melomys callopes</i>			Adelaide (not seen)
<i>Melomys hintoni</i>	Type		B.M. 27.4.1.6
<i>Melomys frigidicola</i>		Type	A.M.N.H. 151201
<i>Melomys rufescens</i>	Type		B.M. 77.7.18.27
<i>Melomys musavora</i>		Cotypes	Sydney, M.2367-2368
<i>Melomys bougainville</i>	Type		Sydney, M.5757
<i>Melomys stalkerii</i>	Type		B.M. 4.6.7.11
<i>Melomys gracilis</i>	Type		B.M. 5.11.28.15
<i>Melomys dollmani</i>	Type		B.M. (field) 343
<i>Melomys sexplicatus</i>	Type		Leiden A
<i>Melomys hageni</i>	Type		Sydney, M.6113
<i>Melomys niviventer</i>		Type	A.M.N.H. 105431
<i>Melomys calidior</i>	Type		B.M. 11.11.11.36

	PHOTO- GRAPHED AND STUDIED	STUDIED, NOT PHOTO- GRAPHED	MUSEUM NUMBER
<i>Melomys leucogaster</i>	Type		Leiden, (field) 119
<i>Melomys latipes</i>		Type	A.M.N.H. 104273
<i>Melomys rubicola</i>	Type		B.M. 46.8.26.7
<i>Melomys arcium</i>	Type		B.M. 89.6.3.2
<i>Melomys fulgens</i>	Type		B.M. 20.7.26.20
<i>Melomys caurinus</i>	Type		B.M. 21.2.9.2
<i>Melomys talaudium</i>	Type		B.M. 21.2.9.3
<i>Uromys macropus</i>	Type		B.M. 66.4.23.6
<i>Uromys caudimaculatus</i>			(Not seen)
<i>Uromys sherrini</i>	Type		B.M. 22.12.18.9
<i>Uromys exilis</i>			(Not seen)
<i>Uromys aruensis</i>	Type		B.M. 72.3.5.3
<i>Uromys aruensis</i>	Paratype		B.M. 72.3.5.2
<i>Uromys validus</i>			(Not seen)
<i>Uromys papuanus</i>			(Not seen)
<i>Uromys nero</i>	Type		B.M. 13.6.18.13
<i>Uromys scaphax</i>	Type		B.M. 13.6.18.8
<i>Uromys prolixus</i>	Type		B.M. 97.8.7.67
<i>Uromys ductor</i>	Type		B.M. 3.12.1.4
<i>Uromys siebersi</i>	Type		B.M. 23.4.3.12
<i>Uromys multiplicatus</i>	Type		Leiden, no number
<i>Uromys waigeuensis</i>			(Not seen)
<i>Uromys lamington</i>	Type		Sydney, M.4684
<i>Uromys anak</i>	Type		B.M. 7.5.22.2
<i>Uromys rothschildi</i>	Type		B.M. 12.1.31.2
<i>Uromys rex</i>	Type		B.M. 88.1.5.34
<i>Uromys rex</i>			Genoa, C.E.3459
<i>Uromys imperator</i>	Type		B.M. 88.1.5.33
<i>Uromys porculus</i>	Type		B.M. 89.4.3.8
<i>Uromys salomonis</i>		Type	Sydney, A.11257
<i>Solomys sapientis</i>	Type		B.M. 2.5.1.4
<i>Solomys salebrosus</i>	Type		Sydney, M.5590
<i>Uicomys ponceleti</i>	Type		Sydney, M.5756
<i>Uicomys ponceleti</i>	Topotype		Sydney, M.6341
<i>Pogonomelomys mayeri</i>	Cotype		Tring (field) 182
<i>Pogonomelomys bruijnii</i>	Type		Genoa, C.E.3677
<i>Pogonomelomys brassi</i>		Type	A.M.N.H. 105033
<i>Pogonomelomys sevia</i>		Type	A.M.N.H. 79755
<i>Pogonomelomys tatei</i>			(Not seen)
<i>Pogonomelomys rümmeleri</i>		Type	A.M.N.H. 150669
<i>Pogonomelomys fraterculus</i>	Type		B.M. 20.7.26.26
<i>Rattus exulans</i> , subspecies from Western Australia	(Not a type)		
<i>Rattus aitape</i>			Sydney, M.3721 (not seen)
<i>Rattus gawae</i>			Sydney, M.6370 (not seen)
<i>Rattus lassacquieri</i>	Type		Sody, (field) 51
<i>Rattus manoquarius</i>	Type		Sody, (field) 55
<i>Rattus praeceus</i>			Sydney, M.6110 (not seen)
<i>Rattus suffectus</i>			Sydney, M.4156 (not seen)
<i>Rattus tibicen</i>			Sydney, M.2483 (not seen)
<i>Rattus browni</i>	Type		B.M. 77.7.18.26
<i>Rattus echimyoides</i>			(Not seen)
<i>Rattus glauerti</i>	Type		B.M. 26.7.12.2
<i>Ratti rennelli</i>			Sydney, M.4213 (not seen)

	PHOTO- GRAPHED AND STUDIED	STUDIED, NOT PHOTO- GRAPHED	MUSEUM NUMBER
<i>Rattus assimilis</i>	Cotype		B.M. 58.11.24.9
<i>Rattus assimilis</i>	Cotype		B.M. 58.11.24.10
<i>Rattus coracius</i>	Type		B.M. 22.12.18.28
<i>Rattus manicatus</i>	Type		B.M. 58.11.24.7
<i>Rattus greyi</i>	Cotype		B.M. 41.1264
<i>Rattus greyi</i>	Cotype		B.M. 41.1266
<i>Rattus peccatus</i> (= <i>ravus</i>)	Cotype		Melbourne, C.688
<i>Rattus austrinus</i>	Type		B.M. 55.12.24.336
<i>Rattus murrayi</i>	Type		B.M. 23.3.28.6
<i>Rattus ruber</i>	Type		Leiden A
<i>Rattus sansapor</i>	Type		Sydney, M.7195
<i>Rattus jobiensis</i>	Type		Berlin, 45677
<i>Rattus biakensis</i>	Type		Sydney, M.7082
<i>Rattus steini</i>	Type		Berlin, 45676
<i>Rattus coenorum</i>	Type		B.M. 22.2.2.19
<i>Rattus bandiculus</i>	Type		B.M. 22.2.2.22
<i>Rattus tramitius</i>	Type		B.M. 22.2.2.13
<i>Rattus ulakwa</i>	Type		B.M. 13.6.18.65
<i>Rattus hageni</i>			Sydney, M.6102 (not seen)
<i>Rattus purdiensis</i>			Sydney, M.7183
<i>Rattus mordax</i>	Type		B.M. 4.8.3.1
<i>Rattus praetor</i>	Type		B.M. 88.1.5.39
<i>Rattus mediocris</i>	Type		Sydney, M.5761
<i>Rattus rosalia</i>			B.M. (field) 588 (not seen)
<i>Rattus leucopus</i> (= <i>terraereginae</i>)	Cotype		B.M. 67.5.6.4
<i>Rattus mcilwraithi</i>		Type	A.M.N.H. 153968
<i>Rattus cooktownensis</i>		Type	A.M.N.H. 153986
<i>Rattus ringens</i>	Type		Genoa, C.E.3460
<i>Rattus doboensis</i>			Frankfurt ? (not seen)
<i>Rattus ratticolor</i>	Type		Leiden, (field) 84
<i>Rattus doboduriae</i>			Sydney, M.6960 (not seen)
<i>Rattus owiensis</i>			Sydney, M.6993 (not seen)
<i>Rattus verecundus</i>	Type		B.M. 3.12.1.1
<i>Rattus forsteri</i>			Leiden, 292/2 (not seen)
<i>Rattus mollis</i>		Type	M.C.Z. 29905
<i>Rattus unicolor</i>	Type		Berlin, 45678
<i>Rattus niobe</i>			B.M. 5.11.28.7
<i>Rattus pococki</i> (= <i>clarae</i>)	Type		Berlin, 45679
<i>Rattus haymani</i> (= <i>klossi</i>)	Type		B.M. 13.6.18.83
<i>Rattus arrogans</i>	Type		B.M. 22.2.2.24
<i>Rattus rufulus</i>	Type		B.M. 28.10.1.34
<i>Rattus arfakiensis</i>	Type		B.M. 29.5.27.36
<i>Rattus richardsoni</i>		Type	A.M.N.H. 150701
<i>Rattus ceramicus</i>	Type		B.M. 20.7.26.28
<i>Rattus shawmayeri</i>			B.M. (field) 636 (not seen)
<i>Rattus youngi</i>	Type		B.M. 26.7.1.1
<i>Rattus youngi</i>	Paratype		Queensland, 4074
<i>Rattus vallesius</i>	Type		B.M. 47.8.14.5
<i>Rattus lutreolus</i>	Cotype		B.M. 41.1258
<i>Rattus lutreolus</i>	Cotype		B.M. 41.1259
<i>Rattus cambricus</i>	Cotypes		Sydney, M.3192, 3193
<i>Rattus imbil</i>	Type		Sydney, M.6228
<i>Rattus vellerosus</i>	Cotype		B.M. 47.3.1.2
<i>Rattus velutinus</i>	Type		B.M. 77.7.3.1

	PHOTO- GRAPHED AND STUDIED	STUDIED, NOT PHOTO- GRAPHED	MUSEUM NUMBER
<i>Rattus fuscipes</i>	(Not a type)		B.M. 6.8.1.70
<i>Rattus mondraineus</i>	Type		B.M. 7.7.18.3
<i>Rattus tunneyi</i>	Type		B.M. 4.1.3.30
<i>Rattus woodwardi</i>	Type		B.M. 5.1.3.30
<i>Rattus melvilleus</i>	Type		B.M. 13.6.28.33
<i>Rattus dispar</i>	Type		Melbourne, 12642
<i>Rattus culmorum</i>	Type		B.M. 7.9.15.21
<i>Rattus sordidus</i>	Cotype		B.M. 58.11.24.5
<i>Rattus sordidus</i>	Cotype		B.M. 58.11.24.6
<i>Rattus lacus</i>		Type	A.M.N.H. 107312
<i>Rattus gestri</i>	Topotype		Genoa, C.E.3501
<i>Rattus gestri</i>	Cotype		B.M. 97.8.7.36
<i>Rattus brachyrhinus</i>	Type		A.M.N.H. 104210
<i>Rattus aramia</i>		Type	Sydney, M.4893
<i>Rattus apex</i>		Type	Sydney, M.3391
<i>Rattus conatus</i>	Type		B.M. 23.1.5.15
<i>Rattus colletti</i>	Type		B.M. 4.4.4.4
<i>Rattus villosissimus</i>			(Not seen)
<i>Rattus profusus</i>	Type		B.M. 41.1262
<i>Rattus doriae</i> (= <i>beccarii</i>)	Type		Genoa, C.E.3534
<i>Rattus venheurni</i>	Type		Amsterdam, NG6
<i>Rattus bunae</i>			(Not seen)

MORPHOLOGY AND EVOLUTION

MORPHOLOGY

IN SPITE OF THE seemingly wide diversity of the rodents of Australia and New Guinea, many of the visible differences between them are differences of degree only. As the ensuing comparative treatments of organs and parts will show, absolute differences, such as the presence or absence of structures, are uncommon. Though there is yet no assurance that the genus *Rattus* is generally typical of its family, or that the species *norvegicus* is centrally placed in *Rattus*, it has been found convenient to use *Rattus norvegicus* as a basis for comparison.

PELAGE

In the Norway rat there are three kinds of dorsal hairs: wool hairs, flat spines, and terete guard hairs. The width of the widest of the flat, channeled spines growing on the dorsal surface is barely in excess of 0.1 mm. In *Rattus leucopus* the definitely spinous pelage contains numerous grooved spines with widths as great as 0.3 mm. and a fair number of terete guard hairs. In all other species the spines are proportionately narrower. In the case of *R. leucopus*, which typically inhabits a land of red lateritic soils, enough soil particles have become deposited in the spine channels as the animals brush against the sides and roofs of their burrows to give to old specimens a distinctly reddish appearance.¹ The true guard hairs, which are fewer than the spines, are considerably longer and more or less circular in section. The great majority of genera have pelage that accords more or less with that of *Rattus*.

In *Hydromys* I find, besides the normal fine wool hairs, only one form (in two color types) of dorsal over-hair. This over-hair differs from both normal guard hairs and normal spines of *Rattus* by being extremely attenuate for the basal half of its length and then broadening its diameter rather suddenly to many times the basal diameter for most of the remainder of its length. It tapers again

¹ Some of the encrusting soil particles, scraped away from the spine channels and tested by one of the Museum's technicians, have given a weak reaction for iron.

to a point. The terminal half of the hair is shining blackish brown in the one type and horn-colored in the other. The two colors together impart the beautiful glossy sheen characteristic of the pelt of *Hydromys*. The related *Parahydromys* has over-hairs essentially similar to those of *Hydromys*. But instead of showing the abrupt enlargement as in *Hydromys* the over-hairs taper from the greater diameter of the distal part of each hair to the lesser diameter of the basal half. The hairs lack the pronounced gloss of those of *Hydromys chrysogaster*.

In *Leptomys* the hairs of the dorsal and ventral parts of the trunk are likewise of two kinds only: wool and guard hairs. The wool hairs are somewhat kinked, gray based and brown tipped. The other halves are not narrowed in comparison with their distal halves as in *Hydromys* and *Parahydromys*. The terete hairs are not coarse but fine and straight and very little longer than the wool hairs.

In the shrew-like *Microhydromys*, in which the pelage is short and extremely fine, there are also but two sorts of hairs: dark-tipped wool hairs with paler bases and minute straight guard hairs of about equal length. In this case the guard hairs distinctly show the taper described in *Parahydromys*.

In *Xeromys* I have been unable to find any true differentiation of the hairs, nor do any appear to taper as indicated above.

The foregoing provides a synoptic cross section of the dorsal pelage of the Hydromyinae. Turning back to the Murinae I find the three types of hairs already mentioned for *Rattus*: the channeled hairs very fine in *Uromys*, *Xenuromys*, *Melomys* (channeled hairs very narrow and white; guard hairs black, very long). But in *Notomys*, *Pogonomys*, *Anisomys*, *Hyomys*, and *Mallomys*, I can distinguish only wool hairs and fine black guard hairs. *Macruromys* carries a heavy coat of guard hairs but relatively few wool hairs.

MOLT

Very few specimens in our collections show definite indications of molt. In a specimen of *Melomys cervinipes* the gray molt line

can be seen crossing back at the shoulders and thence turning forward on each side to the ears. The hairs within this area and forward onto the head are a little shorter than those on the dorsal area beyond the line, but I could find no place where brown-tipped new hairs are growing up through the old hairs to replace them.

In an example of *Melomys moncktoni* the usual cinnamon color of the rump is replaced forward by much darker hair, forming a sharp transverse line of transition; and still farther cephalad, on the shoulders, cinnamon hairs gradually replace the darker ones. It appears that an extensive replacement of black guard hairs is in process, for the dark area is largely caused by the black tips of guard hairs just coming to the general hair surface. Caudad from the dark area the old guard hairs seem to be absent. Cephalad, though there are guard hairs, newly lengthened cinnamon-tipped wool hairs have surpassed and concealed them. The length of the dark-haired area is about $1\frac{1}{2}$ inches. The date and locality of capture, October 16, along the lower Fly River.

In a specimen of *Uromys beccarii* from the lower Fly River, taken October 19, molt is clearly in process. The guard hairs and channeled hairs have been molted from the entire rump as far forward as the lumbar region. All over that area as far back as the base of the tail, the first quarter inch to half inch of newly growing guard and channeled hairs can be found concealed under the wool hair rather closely appressed to the skin. Forward of the lumbar molt line the already fully grown new hairs obscure the wool hairs. On each thigh, where the wool hairs have also been shed, the tips of the short young guard hairs and channeled hairs are fully visible. It is likely that the replacing hairs grow with great speed.

A specimen of *Hydromys reginae* from Portland Roads, Cape York Peninsula, May 31, is in molt. In this case the glossy guard hairs are absent or shed in the area between the back of the head and middle of the back. New guard hairs are already developed beneath the wool hairs, and the crown appears clad in newly grown guard hairs which by lengthening have exceeded and covered the wool hairs. At the mid-back, the area of unshed old pel-

age, the new hair can be seen at the roots of the coat, its black tips appressed to the skin and protruding perhaps 0.2 to 0.5 mm. The molt lines are not defined clearly.

It appears then from the various examples given that the molt in most Australian rodents begins at the head and sweeps along the back towards the tail. I have no decisive evidence on the shedding of the often minute tail hairs that grow in threes from beneath each scale. The appearance of some *Melomys* suggests that they are molted also. Nor have I anything to offer on the time of shedding of the vibrissae.

SKIN GLANDS

So far as I am aware *Notomys* is the only genus in which specialized areas of skin and hairs are developed. They are discussed under *Notomys*.

EYES

Almost all the truly arboreal genera have large eyes, and conversely the scampering or aquatic genera have smaller ones. There are no truly burrowing genera in the Australian region in which the eyes are as greatly reduced as we see in such exotics as *Podoxymys* and *Blarinomys* of South America or *Typhlomys* of Asia. Large-eyed are *Pogonomys*, *Mesembriomys*, *Conilurus*, *Leporillus*, *Notomys*, and arboreal *Melomys*. *Rattus* and numerous other genera can be held to have the eyes normal or unenlarged.

EARS

The ears of Australian rodents vary only within narrow limits. The variation relates chiefly to size, and only occasionally to changes of shape. Comparison of the shapes of the pinnae of such widely divergent genera as *Rattus* of the Murinae and *Leptomys* of the Hydromyinae reveals virtually no differences. A degree of specialization, probably without adaptive value, is seen in *Lorentzimys nouhuysii*, in which the pinna, after the initial basal expansion, tapers in a smoothly wedge-shaped form to its finely round-pointed tip. Also, the extreme degree of reduction of the pinna of the aquatic *Crossomys*, which rises only a millimeter or so above the crown, can be considered a pronounced specialization. Any other changes are changes of degree.

Ears somewhat smaller proportionately than in *Rattus* can be seen in *Anisomys*, *Hyomys*, *Macruromys*, *Mallomys*, some *Melomys*, *Pogonomys*, some *Uromys*, *Xenuromys*, and *Hydromys*. Ears proportionately larger than in *Rattus* are found in *Notomys*, *Conilurus*, and *Leporillus*.

Large or small size of the external ear is not necessarily connected with the size of the audital bulla. In some cases where the external ear is large (*Notomys*) the bulla is also large—longer than the molar tooth row. But in others with normal unenlarged pinna, such as *Rattus tunneyi*, the bulla may be much increased in size. Animals with enlarged pinnae and/or enlarged bullae are frequently inhabitants of open country.

LIPS

Only the lips of the aquatic Hydromyinae, *Hydromys*, *Parahydromys*, and *Crossomys*, need special mention here. In all three there is a degree of tumidity of the upper lips, which is pronounced in *Parahydromys*. When the animal has been newly skinned the thickened tissues of the upper lips are seen to be filled with the unusually large bases of the vibrissae and their activating muscles and nerves. This tumidity gives the front of the rostrum the broad, blunt appearance characteristic of these water rats.

HANDS

There appears to be less variation in the character of the hand than in that of the feet. This variation, where it exists at all, seems to relate only to the claws (size of curvature) and the pads (size). In the *Rattus* hand there are three large interdigit pads, placed between the bases of digits 2 to 5, and two large palmar pads. All five digits have claws, the claw of digit 1 being shorter and much blunter than the rest. In the widely separated *Hydromys* the principal difference lies in the narrower and more elongated form of the external palmar pad. The claws are blunter and heavier. In some instances, as in *Hyomys*, *Macruromys*, *Mallomys*, *Conilurus*, *Notomys*, and *Pogonomys*, the pollex is more reduced and its claw shorter and more nail-like, but the distinction is not absolute, as the "claw" of digit 1 of *Rattus* could be described almost as correctly as a nail.

FEET

The chief variations seem to be related to function: tree-climbing, digging, leaping, and swimming. Most scansors have the metatarsal area of the foot broad in relation to its length. This is accompanied by strengthened and more curved claws. Examples are *Pogonomys* (typically), some *Melomys*, some *Pogonomelomys*, *Uromys*, and *Mesembriomys*. Leaping genera are limited to one, *Notomys*. But *Leptomys* and *Conilurus* can be thought of as incipient leapers also. Swimming forms are found in *Hydromys*, *Crossomys*, and *Parahydromys*. In all three the sole is modified and "rubbery," while the claws, though unshortened, are not much curved.

FOOT-PADS

In Australian Muridae there are normally six pads, four of which are placed at the bases of the interspaces of the five digits, and two are plantar pads, the hallucal one of which is posterior to the external one. In some arboreal rats, such as *Pogonomys* and some *Pogonomelomys*, these pads become considerably enlarged. Numerous exceptions occur, as in *Notomys* and some Hydromyinae. In *Notomys* both the plantar pads appear to be absent, and in *Notomys fuscus*, according to Jones, the hallucal pad is also. In *Microhydromys* and *Parahydromys* the normal count of six pads is found. In *Xeromys* this is also true, but the hallucal pad is very long and partly divided into two parts, while the external plantar pad is very small. In *Paraleptomys* and *Microhydromys* the external plantar pad seems to be absent, in *Hydromys* both plantar pads are obsolescent, while in *Leptomys* they seem to be wholly absent.

TAIL

The normal *Rattus*-type of tail is almost as long as, or a little longer than, the head and body. It is covered with scales arranged in rings and from the base of each scale three hairs project posteriorly. Various modifications appear. The hairs may be more elongate (some other species of *Rattus*, and *Hydromys*), very short (many of the *Uromys* group of genera), or much elongated at the tip (the brush tip in *Notomys*). In *Crossomys* the hairs of the under side of the tail are

arranged in keel-like rows, in relation doubtless to the animals' aquatic life. The color may be dark beneath as well as above (some *Rattus*, some *Melomys*, and some *Uromys*), or the base may be dark, with the tip white (*Hydromys*, *Uromys*, some *Rattus*, and many others). More fundamental changes are also seen. In *Zyomys* and *Laomys* the portion of the tail just beyond the base and nearly reaching the middle may become swollen so as to function as a seasonal storage organ. In *Pogonomelomys* and *Pogonomys* the upper surface near the tip is bare and covered with tactile skin, and the tail acts as an upwardly grasping organ. In the *Uromys* group of genera (except *Xenuromys*) the scales of the tail are often sculptured and thickened, and are set edge to edge instead of in the usual overlapping manner.

MAMMAE

There is a strong tendency for the majority of Australian rodents to exhibit a lower mammary count than is usual in *Rattus rattus*. Furthermore, barring some anomaly and with the single exception of *Rattus*, each genus has apparently an invariable mammary formula. The formulas are set forth below:

FORMULAS	EXAMPLES
0-2=4	All known Hydromyinae, all known <i>Pseudomys</i> and <i>Leggadina</i> , <i>Mastacomys</i> , <i>Notomys</i> , <i>Zyomys</i> , <i>Mesembriomys</i> , <i>Leporillus</i> , <i>Conilurus</i> , <i>Hyomys</i> , <i>Macruromys</i> , the <i>Uromys</i> group of genera
1-2=6	<i>Lorentzimys</i> , <i>Mallomys</i> , <i>Anisomys</i> , <i>Pogonomys</i> , the <i>Rattus leucopus</i> group, the <i>Rattus niobe</i> group
2-2=8	The <i>Rattus exulans</i> group, the <i>Rattus ruber</i> group
1-3=8	<i>Rattus assimilis coracius</i> (?)
2-3=10	The <i>Rattus assimilis</i> group, the <i>Rattus lutreolus</i> , <i>youngi</i> , and <i>tunneyi</i> groups, the <i>Rattus rattus</i> group
3-3=12	The <i>Rattus gestri</i> group, the <i>Rattus norvegicus</i> group

In the *Rattus rattus* group some degree of fluctuation is believed to exist (for further discussion of which, see under *Rattus*).

INCISORS

Normally the upper incisor teeth are moderately heavy, chisel shaped, and colored

fairly deep orange on their anterior faces. The lower ones are a little paler. Longitudinal grooves appear on the incisors in one genus of the Hydromyinae (*Microhydromys*) and, less well defined, in one species of *Notomys*. The lower incisors of *Anisomys* are greatly compressed from side to side, in comparison with the upper ones. In two species of *Melomys* the upper and lower incisors are white or cream colored instead of orange. The beveled portion of the upper incisor is strongly notched in *Mus musculus* and incipiently so in *Notomys longicaudatus* and in *Lorentzimys*.

MOLARS

A number of structural changes can be perceived in the molars of the Australo-Papuan Muridae. These changes relate to increase or decrease in size, as the large teeth in *Hyomys*, and the reduced teeth in *Macruromys* or *Lorentzimys*; to change in size proportions (gradient) such as enlargement of m_1^1 , combined with diminution of m_3^3 in many genera of Hydromyinae; to obsolescence of parts, as the absence of the labial row of cusps in all three upper molars in *Mesembriomys*, *Zyomys*, *Notomys*, etc., and the development of additional structures, as the postero-internal cusps in *Conilurus* and the cuspule anterior to the first loph of m^1 in *Leggadina*.

It is to be noted that greater stability of structure exists in the lower molars than in the upper. For example, the only important differential feature between the lower teeth of *Mesembriomys* and those of *Uromys* lies in the first loph of m_1 , divided into two distinct cusps in *Mesembriomys*, reduced and narrowed to one cusp in *Uromys*. In *Rattus* the same loph is bicuspid; in *Mus* unicuspid. In *Pogonomys*, a highly modified genus, it is bicuspid and possesses an extra cusp forward and intermediate between the two lateral ones.

The molars of certain genera such as *Rattus* have interlocking functions. The third loph of m^1 is made functionally complete by the presence on the labial side of the forward-projecting single cusp of m^2 . The second loph of m^2 is similarly completed functionally by the anterior labial cusp of m^3 . In the lower molars somewhat analogous interdental co-operation appears in that the short talonids

at the backs, respectively, of m_1 and m_2 function with the first lophs of m_2 and m_3 .

The reverse of these conditions can be seen in *Hyomys* and in *Macruromys* in which the third loph of m^1 and the second of m^2 extend almost completely across their teeth from side to side, and there is no borrowing of function from the adjoining tooth.

The lower molars of *Hyomys* have the occlusal surfaces of all three teeth at the same level. The talonids merely form a part of that uniform grinding surface. The first loph of m_1 is incipiently divided by an infold of enamel at the middle of its posterior wall.

I have touched upon the foregoing genera to show at a glance some of the contrasting dental features revealed by the murids under discussion. The teeth of the remaining genera are now commented upon successively:

XENUROMYS: Both upper and lower incisors very heavy, orange. Molars very like those of *Melomys*. Interlocking function somewhat less complete than in *Rattus*. The first loph of m_1 is undivided.

MELOMYS: In *Melomys cervinipes* the approach of the molar dentition to that of *Rattus* is very close. The lophs tend to be more angular, with the angles pointing forward at the position of the central row of cusps. The corresponding labial and lingual cusps lie rather far back (compared with those of *Rattus*). Functional cooperation, described in *Rattus*, is nearly complete. In m_1 the first loph is unicuspid, not divided as in *Rattus*. The talonids of m_1 and m_2 function with the first lophs of m_2 and m_3 , respectively. In *M. leucogaster* there appears a greater degree of union between the labial and median cusps of each loph. In *M. levipes* there is a degree of narrowing of the molars and thickening (antero-posteriorly) of the individual lophs, particularly of the last lophs of m^1 and m^2 (which become subrectangular), while m^3 becomes considerably reduced. There may be present a slight accessory cuspule anterior to the first loph of m^1 . The small *M. lutillus* has molars essentially similar to those of *leucogaster*, though much smaller.

POGONOMELOMYS: Molars essentially as in *Melomys*. In the *Pogonomelomys sevia-rümmeleri* group, reduction of size in m^3 is accentuated.

MALLOMYS: Sharply different from preceding genera. Especially developed are the labial cusps, which in number exactly conform to the pattern in *Rattus* but, owing to the depth of the reentrants between them, are greatly exaggerated. The lingual cusps, fully as large as the labial ones, contrast less, because in *Rattus* they are also prominent. As in *Rattus*, there are no labial cusps on m^3 , but enlargement of the cusps on the lingual side results in three prominent ones. The curvature of the lophs and the depths of the valleys between them give a pattern resembling a series of trefoils set one behind the other. In the lower teeth the first loph of m_1 , originally bifid, has the outer cusp very nearly obsolete, the inner cusps fully developed. The second and third lophs of m_1 and all lophs of the second and third molars are deeply divided at the center by enamel reentrants from the rear. The talonids are reduced to quite small subtriangular cusps placed centrally behind m_1 and m_2 .

MACRUROMYS: Characterized first by the extreme degree of size reduction in its molars (the incisors are normal). Only one of the series (A.M.N.H. No. 152067) has the teeth sufficiently unworn to provide data. The labial and central cusps of each loph are completely fused, and no trace of valleys can be seen between them. The lingual cusps are reduced to relatively very small size. The teeth stand directly behind one another and show no interlocking from the standpoint of function. In the lower molars the first loph of m_1 is unicuspid and quite narrow. The talonids of m_1 and m_2 are centrally placed and very small.

ANISOMYS: This remarkable rat has molars that are utterly unlike those of any other genus under consideration. Its teeth can be seen in the unworn state in A.M.N.H. No. 151420. The general pattern of the lophs is transverse, as in *Hyomys*, but the details of the positions of the cusps are wholly different. In m^1 there are first, second, and third lophs. On the lingual side an accessory cusp stands between the second and third lophs. Behind and slightly external to loph 3 is a second accessory cusp. In m^2 the same pattern is repeated, the outline of the tooth being slightly shorter and wider and the ridge of loph 2

becoming weakly divided towards its labial side. Substantially the same picture appears in m^3 , except that there are only two lophs, behind which is a large cusp. Perhaps this cusp represents the third loph shortened and thickened. Between the second loph and this large cusp there is an accessory cusp on the lingual side.

There is no trace in *Anisomys* of the anterior lingual cusp of m^2 , which is such a conspicuous feature in *Rattus* and its allies, nor is there sharing of function between contiguous teeth, as in *Rattus*.

In the lower jaw the first loph of m_1 , though nearly as wide as loph 2, appears to be unicuspid. The talonids of m_1 and m_2 are very short but (especially that of m_1) so wide as to form incipient lophs in their own right. In m_3 there are one complete loph and the broad talonid. The tooth is very like that in *Mallomys*.

POGONOMYS: The molars in these peculiar rats are very short and broad, multicuspid, and have the lophs strongly arched. The valleys between cusps are strongly accentuated. The lingual cusps are three each for m^1 and m^2 . Those of m^1 are each related to one of the three lophs. The two posterior ones of m^2 belong to lophs 1 and 2, but the first is the homologue of the first lingual cusp of m^2 in *Rattus*. The three lingual cusps of m^3 are also homologous with the same in *Rattus*. The picture on the lingual side appears precisely like that seen in *Conilurus penicillatus* (beyond).

On the labial side of the molars there are four cusps on each of m^1 and m^2 , three on m^3 . The most anterior on m^1 relates to loph 1 but on m^2 and m^3 stands anterior to the first loph. The second and third cusps on m^1 and m^2 are related to lophs 2 and 3, and 1 and 2, respectively. In m^3 the second cusp relates to the loph and the third to the talon. The fourth cusps on m^1 and m^2 are mere postero-external extensions of the main median cusp of the hindmost loph of each tooth. Thus, the labial sides of the molars of *Pogonomys* present almost no similarity to the same in *Conilurus*.

In the lower molar series the first loph of m^1 is not only bicuspid, but each portion has a subsidiary anterior tubercle. The talonids

are quite small, oval, and centrally placed behind m_1 and m_2 . A weak but distinct cingulum is present on the labial side of m_1 and m_2 (only near the front of m_3). The labial portion of the second ridge of m_3 is very small. These observations, based chiefly upon a juvenal *P. macrurus* with unworn teeth (A.M.N.H. No. 108456), are confirmed by comparison with other specimens.

MUS: The molars of this genus have the usual ranked cusps, the lingual ones of which are drawn far back along the body of the tooth. There is a degree of functional cooperation between m^1 and m^2 and m^2 and m^3 , as in *Rattus*. The first molar is considerably enlarged, the third much reduced in size. Labial cusps are present for all lophs of m^1 and m^2 but are absent in m^3 . In the lower molars the first loph, though narrow, is bicuspid. The lingual cusp is the larger of the two. The talonids are small, oval, and medial-laterally placed behind the molars.

LORENTZIMYS: Like *Macruromys*, this genus has extremely minute teeth (broad and short). In it the labial cusps are absent, either obsolete or merged with the median series, except in m^2 where a minute cuspule appears in front of the first loph. On the lingual side the pattern is like that of *Rattus*, lingual cusps being present for lophs 1 and 2 of m^1 . There is partial functional cooperation in that the lingual cusp of m^2 anterior to the first loph acts as the lingual cusp for loph 3 of m^1 . The same occurs between m^2 and m^3 , these two molars having each two lingual cusps. In the lower jaw loph 1 of m_1 is undivided. The talonids are rather large and centrally placed. There is no cingulum as in *Pogonomys*.

PSEUDOMYS: A strong trend towards non-development, or possibly obsolescence, of the labial series of molar cusps is seen in this genus and in following genera. The lingual cusps are two to each molar, and there is functional interplay as in *Rattus*. A supplemental cuspule with separating groove appears on the intero-anterior face of m^1 . The partly abraded surface of m^3 resembles that of *Apodemus* rather than of *Mus*, though it lacks the reentrant groove on the labial side. In the lower molars m^1 has the first loph distinctly bifid, the internal cusp slight-

ly the larger. The talonids are centrally placed, small, and rather short and broad. The third molars, upper and lower, are not reduced in size. There are no cingula.

LEGGADINA: A marked increase in the backward inclination of the laminae of the upper teeth and forward inclination of those of the lower teeth is found in this genus as in *Mastacomys*. Near-absence of labial cusps is continued, as in *Pseudomys*. The lingual cusps, strongly developed, are as in *Pseudomys* and *Rattus*. The accessory cusp anterior and internal to loph 1 of m^1 is better developed than in *Pseudomys*. The last molars, upper and lower, are decreased in size somewhat as in *Mus*. In the lower jaw the first loph of m^1 is bicuspid (in *Leggadina delicatula*, seemingly unicuspid in *L. waitei*), and the other characters agree with *Pseudomys* (m^3 in *L. waitei* especially shortened).

LEPORILLUS: I have only one worn *Leporillus jonesi* for study. The dental features of the upper teeth are in quite close agreement with those of *Pseudomys*, the labial cusps being barely separated from the mesial ones. Functional interplay of the molars, as in *Rattus*, is evident.

NOTOMYS: The same general pattern appears in the molars as in *Pseudomys*, *Leggadina*, and *Leporillus*. The labial row of cusps is equally ill developed.

MASTACOMYS: The molars are strongly specialized in the directions of great broadening and considerable shortening of the teeth, the last molar being secondarily enlarged. Extreme inclination of the laminae, foreshadowed in *Leggadina*, is achieved in *Mastacomys* and this is combined with pronounced hyposodontism of individual cusps and deepening of the valleys between them. After these special characters are allowed for, the basic cusp pattern is seen to conform quite closely to that of *Pseudomys*. That is to say, the labial series of cusps is obsolete except on the second loph of m^1 and the first loph of m^2 . The lingual cusps are well developed, there being no posterior (third) one at the back of m^1 or m^2 (present in *Zyzomys*, *Conilurus*, etc.). The last element of m^3 is broad enough to include both the main row and the labial row of cusps.

In the lower molars the first loph of m_1 is bicuspid, the outer cusp being the smaller.

The talonids appear to be completely obsolete, a stage nearly achieved in *Laomys*. The last element of m^3 is considerably broader (almost as broad as the loph) than in *Pseudomys*. It conforms nearly to the condition in *Laomys*.

ZYZOMYS: This genus begins a short series of genera in which a third (last) lingual cusp is present on m^{1-3} . In this respect (but in no other) it agrees with *Pogonomys*. The absence of labial cusps is virtually total, only traces appearing on lophs 2 to 3 of m^1 and 1 to 2 of m^2 . There is a suggestion of a cuspule anterior to loph 1 of m^1 , as in *Pseudomys* and *Leggadina*. The presence of the third lingual cusp eliminates functional interplay between molars. In the lower jaw loph 1 of m^1 is weakly bifid. The talonids are extremely small, and compressed from front to back.

LAOMYS (SUBGENUS): The loss of the labial cusps seems to be complete in *pendunculatus*. The lingual series is as in *Zyzomys*. The last element in m^3 is bicuspid as in *Zyzomys*. In the lower molars the talonids are reduced to minute posterior cingula on m_1 and m_2 . Otherwise agreement with *Zyzomys* is complete.

MESEMBRIOMYS: Characters of *Zyzomys*, except further development of cingulum anterior to loph 1 of m^1 which bears two to three cuspules. The lower molars show the characters of *Zyzomys*, with talonids less reduced than in *Laomys*, about as in *Zyzomys*.

CONILURUS (PENICILLATUS): This belongs to the same group of genera as the three foregoing. The labial cusps are still distinct on loph 2 of m^1 and loph 1 of m^2 . There are three strongly developed cusps in lingual series on each of the three molars. In the lower jaws the talonids are reduced to cuspules but are still distinct. The last element of m_3 is unicuspid and placed in the labial row of cusps, not crossing both labial and mesial rows as in the three foregoing genera.

HYDROMYINAE: The molars of the Hydromyinae appear to be formed on a fundamentally different pattern from those of the Murinae. In the latter we have seen that the cusps of the upper teeth are generally arranged in three ranks, and that in certain generic groups the external or labial rank of cusps may be virtually absent. Whether the weak development of that labial rank

of cusps represents a primary condition, denoting incipient development of the cusps, or a secondary condition, signifying that the small cusps are rudiments of formerly larger structures, is still to be settled. In the Hydromyinae, however, the molar cusps seem, as in the Cricetinae and as in the lower teeth of the Murinae, to be fundamentally two-ranked. The outer walls, which show but few infolds, are formed of very hard enamel, and with wear the interior of each tooth or major section of each tooth becomes hollowed out or "basined." A second important feature in the subfamily is the tendency to loss of m_3^2 .

LEPTOMYS: This is the only hydromyine genus in which the last upper molars are still present. Three labial and two lingual cusps occur on m_1^1 , two labial and three lingual (the posterior two almost confluent) on m_2^1 ; and one labial and two lingual (all very imperfectly divided from one another) on the much reduced m_3^1 . In the lower molars there are three labial and three lingual cusps on m_1 , two labial and two lingual on m_2 , but m_3 is a reduced, nearly globular, thick-walled structure with its top basined. The talonids of m_1 and m_2 are low and ledge-like, and tend to be placed towards the outer part of the back of each molar. There are two "basins" in each of the first and second molars and one in the third in both the upper and the lower series. A tendency is present for a third basin to develop in *Leptomys*, occasioned by the wear and hollowing out of the last labial cusp of m_1 and m_2 . In succeeding genera development of this extra basin is confined to m_1 .

In respect of m_1^1 all the remaining hydromyine genera conform to this general picture. But as m_3^2 are lost in all but *Baiyankamys* (m_3 is retained in it), m_2^2 become altered into terminal structures. This change is accompanied by the loss of the second labial cusps (as such), which assume posterior positions, and the disappearance of the third (weakly differentiated in *Leptomys*) lingual cusps. In the lower molars there are corresponding changes in m_2 , and its talonid is lost; *Paraleptomys* typifies this condition.

Pseudohydromys and *Microhydromys*, though so much smaller than other genera, give exactly the same molar picture as *Paralep-*

tomys. *Xeromys* has molars substantially as in *Paraleptomys*. I have not seen *Baiyankamys*, in which m_3 is retained while m_3^2 is lost. The m_3 of this genus is possibly so rudimentary that it no longer enters into the occlusal pattern.

In *Parahydromys* and *Hydromys* m_1^1 has become definitely three-basined. This has come about through the differential enlargement and hollowing out of the third labial cusp of *Leptomys*. The width of that third basin is only a little less than that of the first basin. The largest basin is the median one. In m_2^1 the first lingual cusp is basined, as it is also in *Paraleptomys* and its allies. In the lower series there are two large basins on each tooth (m_1 and m_2). The talonid of m_1 is still present.

Crossomys has molars constructed on the same pattern as those of *Hydromys* and *Parahydromys*.

THE PRESIPHENOID AND ADJACENT PARTS

In *Rattus norvegicus* the presphenoid, seen from the side, is bounded anteriorly and above by the orbital wall of the frontal, beneath by internal, wing-like processes from the palatine bones. Posteriorly it passes from view behind the alisphenoid wing of the basisphenoid. The presphenoid is pierced by the large optic foramen, through which the unpaired longitudinal body of the bone can be seen as a sharp ridge fused to its paired, wing-like portions. The posterior end of the body of the presphenoid can be seen through the base of the skull solidly abutting against the unpaired central body of the basisphenoid. The pair of large openings showing where the presphenoid goes behind the basisphenoid wings are the combined anterior lacerate foramen and foramen rotundum. In the Australian-Papuan Muridae this bone and its foramina undergo various changes.

In the *Rattus gestri* group the palatine wings are cut squarely off above m_3 , leaving an exceptionally large opening for the anterior foramen lacerum. The central body of the presphenoid is exceptionally attenuated and blade-like, becoming thickened only to make contact with the basisphenoid.

In *Uromys caudimaculatus*, owing to building up of the central body, it is not possible

to see from side to side through the optic foramina. Posteriorly the body is so strongly thickened that it widely separates the paired internal palatine wings. The posterior part of each lacerate foramen extends backward for about 0.3 mm. behind the suture with the basisphenoid.

Xenuromys shows the condition of the presphenoid to be somewhat as in *Uromys*, but carried to a greater extreme. The posterior body of the bone is very massive. It separates the two wings of the palatine widely and is so solidly fused to the basisphenoid that the suture cannot be seen. Doubtless it is apparent in juvenals.

In *Melomys* the optic foramina can be seen through from side to side of the skull. The body of the presphenoid in *Melomys levipes* is narrow and compressed except at its posterior end where it expands abruptly to make its union with the basisphenoid. The palatine "wings" which help to roof the mesopterygoid fossa are attached to the presphenoid close together, so that the exposed portion of the presphenoid between them is very narrow. In *M. rufescens* the presphenoid is very slightly wider. Thus *Melomys* remains in this respect fairly close to *Rattus norvegicus*.

In *Pogonomelomys bruijnii* and *P. mayeri* the wing of the presphenoid projects to a quite noticeable extent above and behind the optic foramen, thus differing from *Rattus*. The palatine wings extend their contact with the median body of the bone almost to its junction with the basisphenoid, thus almost completely roofing the mesopterygoid fossa. In *P. rümmleri* the projection above the optic foramen, between the orbital wall of the frontal and the alisphenoid, is so large that contact with the squamosal is almost attained. The posterior part of the unpaired body of the presphenoid is broad and flat; it separates the palatines widely.

In *Mus musculus* the wings of the presphenoid appear to be considerably reduced, so much so as merely to encircle the rather large optic foramen. The bar separating the optic and anterior lacerate foramina is reduced to a very slender column. There is no extension upward of the presphenoid wing between the frontal and the alisphenoid. The posterior median portion of the bone is

broad and flat, the palatine wings bordering it ill developed, leaving large foramina lacera.

Mallomys presents a condition of the presphenoid that is very widely divergent from the presphenoid of *Rattus*. The optic foramen is very small and tubular and emerges from the braincase pointing forward, outward, and slightly upward. The extremely large sphenopalatine foramen (small in *Rattus*) which is bounded jointly by the maxillary (chiefly), the palatine, and a small segment of the frontal, is likely at first glance to be mistaken for the optic foramen in *Mallomys*. The wall between the true optic foramen and the anterior lacerate foramen is very stout. The body of the presphenoid is seen through the mesopterygoid fossa to be rather heavy and in adults completely fused with the basisphenoid.

In *Lorentzimys* both the optic and the anterior lacerate foramina appear as non-tubular perforations in the braincase. (The sphenopalatine foramen is slightly larger than the optic foramen.) There is a slight projection of the presphenoid between the frontal and the alisphenoid in the form of a plate overlying part of the alisphenoid. Posteriorly the centrum of the presphenoid is broadened only for its union with the basisphenoid. The suture does not become fused. The palatine wings join the presphenoid body far forward, so that the mesopterygoid fossa is relatively unroofed.

Hyomys, despite its very different dentition, has an orbital structure very similar to that of *Mallomys*. The optic foramen is similarly reduced and the sphenopalatine foramen enlarged. The posterior part of the body of the presphenoid is fused to the basisphenoid. The palatal laminae are large and so completely fused that the foramina lacera in the roof of the mesopterygoid fossa are reduced to little more than pores.

In *Macruromys major* and *M. elegans* the presphenoid is again much like that of *Rattus*, though the median crest is high enough so that one cannot see through the optic foramina from side to side. The optic foramen is rather small in proportion to the size of the presphenoidal wing. There is no upward projection of that wing between the frontal and the alisphenoid. The sphenoid

palatine foramen remains unenlarged. Within the pterygoid fossa conditions differ from *Rattus*. Paired wings from the basisphenoid (absent in *Rattus*) grow forward to meet the palatine wings, and these with the broad body of the presphenoid virtually roof the fossa. The foramina lacera are absent or obsolescent. The suture with the basisphenoid remains distinct.

Anisomys, a genus with highly distinctive dentition, possesses the orbital arrangement of *Rattus* and *Macruromys*, though nearer to the latter than the former, but there are no backwardly projecting basisphenoid processes such as appear in *Macruromys*. On the other hand the palatine wings are attached to the broad body of the presphenoid as far back as the level of its suture with the basisphenoid.

Pogonomys mollipilosus, despite its dental peculiarities, agrees closely with *Anisomys* and *Macruromys* in the structure of the orbital portions of its presphenoid. One can just see through the orbital foramina as in *Rattus*. The palatal wings roofing the mesopterygoid fossa diverge from the rather narrow body of the presphenoid to allow for quite large foramina lacera, and extend backward beyond the suture with the basisphenoid—a perhaps unique feature.

Pseudomys australis, *higginsii*, *albocinereus*, and *occidentalis* display a considerable degree of specialization of the form of the presphenoid. They introduce the "fenestrated" presphenoid, in which both the optic and the anterior lacerate foramina are extremely large (and to a lesser degree the sphenopalatine foramen), and the separating bar of bone becomes extremely delicate. There is a slight expansion of the presphenoid upward and backward from the optic foramen in the direction of the squamosal as in *Lorentzimys* and *Pogonomelomys*. The palatine wings supporting the presphenoid are small and placed far within the posterior nares above the molars, while the lacerate foramina as seen through the mesopterygoid fossa are very large. The central body of the presphenoid is broad and flat, and its suture with the basisphenoid remains unfused.

Leggadina waitiei, *L. delicatula*, and *L. hermannsburgensis* display substantially the

same presphenoid characters as *Pseudomys*, but the body of the bone is much more slender anterior to the expanded portion that forms the suture with the basisphenoid.

Leporillus jonesi has the optic and sphenopalatine foramina enlarged and of equal size. Though the orbital portion of the presphenoid is extended higher into the frontal than is the case in *Pseudomys*, it does not approach the squamosal. Posteriorly, the central body of the presphenoid is rather attenuate. Its suture with the basisphenoid remains open. *Mastacomys*, represented in our collection only by photographs, could not be studied adequately.

In *Zyzomys argurus* and *Zyzomys (Laomys) pedunculatus* the presphenoid is built substantially as in *Pseudomys*, i. e., with moderate advance of that bone upward into the orbital wall of the frontal and with the bar separating the optic from the anterior lacerate foramen exceedingly slender. Posteriorly the attenuated central body of the bone broadens to meet the basisphenoid. The suture is open.

Mesembriomys gouldii has the orbital portion of the presphenoid much as in *Rattus*. The bar between the optic and anterior lacerate foramina is broad and flat, not attenuated. The form of the unpaired posterior body of the presphenoid is likewise much like that of *Rattus*. The bone is not fused to the basisphenoid.

In *Conilurus* the optic foramen is very large and the median body of the presphenoid very much compressed. The opening for the anterior foramen lacerum extends far forward in such a way that the rod-like body of the presphenoid appears to pass across the middle of the combined optic-lacerate foramen. Posteriorly the compressed presphenoid expands into a substantial stop, against which the centrum of the basisphenoid is sutured.

Notomys can be regarded as attaining the highest degree of fenestration in relation to its presphenoid of any of the Australian genera. The optic foramen is extremely large. The orbital wings of the presphenoid thrust upward and backward towards the squamosal. The median centrum is exceedingly slender and can be seen through the side of the skull crossing the combined optic-anterior lacerate foramen. The back of

the centrum broadens only slightly to make contact with the almost equally slender body of the basisphenoid.

Leptomys shows a small tubular optic foramen placed low in the not extensive orbital face of the presphenoid. The wall between the optic and anterior lacerate foramina is low and flat but strong. The palatine wings roofing the mesopterygoid fossa come nearly in contact with each other close to the midline of the sturdy presphenoid, except within 1.5 to 2 mm. from its suture with the basisphenoid. There they divide to expose more of the posterior body of the presphenoid. They form sutures with the basisphenoid walls of the mesopterygoid fossa directly in line with the open presphenoid-basisphenoid suture.

Paraleptomys wilhelmina and *P. rufilatus* have the presphenoid very like that of *Leptomys*. The optic foramen is less tubular. The exposure of the centrum of the bone in the roof of the mesopterygoid fossa is broader. The walls of the said fossa are fenestrated between the junction of the wings of the palatines and the pterygoid wings of the basisphenoid.

In *Pseudohydromys* the outlines of the orbital part of the presphenoid could not be clearly discerned. There appears to be an exterior common opening for the small optic and anterior lacerate foramina, though they diverge internally. The posterior part of the presphenoid body is thick, separates the palatal wings completely, and is fused to the basisphenoid. The sphenopalatine foramen is very large (longer than m^2).

Xeromys presents a different picture and one nearer to *Leptomys*. The orbital expanse of the presphenoid is restricted to the area of the optic and anterior lacerate foramina, which are separated by a flat bar as in *Rattus*. The optic foramen is moderately large but tubular. The suture joining the rather slender posterior body of the presphenoid with the basisphenoid remains unfused. The sphenopalatine foramen is as large as the surface area of m^2 .

In *Parahydromys* and *Hydromys* the optic foramen is small, the anterior lacerate foramen very large, and the sphenopalatine foramen small (about the same size as the optic).

There is no orbital expansion of the presphenoid. In both, the posterior part of the body or centrum of the presphenoid is broad. Its suture with the basisphenoid is fused in *Parahydromys*, open in young *Hydromys*.

POST-SQUAMOSAL SINUS AND PARIETO-SQUAMOSAL SUTURE

The part of the squamosal most subject to morphological variation in the Muridae is the "post-tympanic hook" (Greene, 1935, p. 14), the portion bounded by the parietal, the occipital, the periotic capsule or mastoid, and the tympanic bulla. The principal variation relates to the presence or absence of a posteriorly placed sinus separating the back of the hook into upper and lower portions. In many of the Australian genera, and indeed in many genera throughout the world, this sinus is so deep that the inferior arm of the hook is reduced to a slender ligulate process.

Rattus norvegicus displays in the back of its squamosal only a very slight embayment which is completely occupied by the lateral process of the occipital. Its upper portion, above the ridge that continues backward from the zygomatic process of the squamosal, is pierced by one small foramen. The suture marking the junction of the squamosal with the parietal in *Rattus* has a pronounced jog in it; it is shaped like a very open or incomplete S. In *Rattus assimilis* this jog is more open than in *R. norvegicus*. In *R. tunneyi* and *R. exulans* the jog is fully developed.

In *Uromys* the post-squamosal sinus is as undeveloped as in *Rattus*. The jog in the suture is reduced to a slight process of the parietal penetrating the squamosal just above and behind the zygomatic process.

In *Xenuromys* the sinus, in incipient form, like the half of an hourglass and very small in size, can be seen just above the mastoid-occipital suture. The jog is absent.

In *Melomys cervinipes* and *Melomys levipes* the sinus is absent, but in *Melomys leucogaster* it appears as a minute cleft between the lower one-third and upper two-thirds of the posterior margin of the squamosal hook. The jog in the parieto-squamosal suture is slight in the first two, sharply angled in *M. leucogaster*. In *Melomys lutillus*

there is no trace of the sinus; in *Melomys rubex* it is merely incipient. The jog in both is well developed.

Pogonomelomys bruijnii and *P. mayeri* show the slight cleft as in *Melomys leucogaster*. In *P. rümmleri* it is sufficiently developed to make the lower marginal process twice as long as wide. The jog is pronounced only in *P. mayeri*.

In *Mallomys* the sinus, though distinct, is very shallow and open, the inferior bounding process only about one and one-half times as long as broad. The jog is slight only.

In *Hyomys* the sinus is undeveloped, as in *Rattus*. The parieto-squamosal suture is nearly straight.

Macruromys likewise displays no trace of the squamosal sinus. The suture is rather irregular.

The same is true of *Anisomys*.

Pogonomys may have a faintly incipient sinus of minute size. The suture is rather markedly irregular.

Mus shows a deep sinus, narrowly V-shaped, its inferior bordering process about four times as long as broad, its upper process approximately twice as long as broad. The jog in the parieto-squamosal suture is pronounced.

Pseudomys displays a deep but narrowly V-shaped sinus, the inferior bordering process of which is very slender and expanded at the tip to make sutural contact with the mastoid. The entrance to the sinus is partly closed by a process of the occipital. The parieto-squamosal suture is moderately sigmoid.

In *Leggadina* there is a more or less hook-shaped process of the occipital which bends forward into the upper part of the well-developed sinus. In *Leggadina waitei* this hook is narrow and pointed and penetrates the sinus for more than half its depth. In *L. delicatula* the hook is broader and penetrates less deeply. The lower ramus of the post-tympanic hook of the squamosal is very slender, ligulate, and meets the mastoid, as in *Pseudomys*. The parieto-squamosal suture of *Leggadina* is distinctly sigmoid.

The sinus in *Lorentzimys* is placed very close to the lower edge of the "posterior hook." It is proportionately large and deep.

The inferior process of the squamosal is so slender that its length is about eight times its width. The jog in the suture is almost obsolete.

Leporillus jonesi has a narrowly V-shaped sinus, the lower margining process of which is stouter than in *Pseudomys* or *Leggadina*. The hook-like process of the occipital mentioned for *Leggadina* is also present. The suture marking the meeting of the squamosal with the parietal is strongly angled.

Notomys possesses a squamosal sinus with the general characters seen in *Pseudomys*, *Leggadina*, and *Leporillus*. Its entrance is in part closed by an occipital hooked process; its inferior margining bar is extremely slender. The suture of the squamosal with the parietal is not zigzag but tends to be evenly bowed outward.

In *Zyzomys* the squamosal sinus is peculiarly modified. The tip of the inferior process is broadened into a nearly rectangular plate which, besides making the usual contact with the mastoid, also touches the occipital, thus closing the mouth of the sinus. The sinus itself is very narrow and is pointed at its deepest part, while its lower containing bar is somewhat broader than is the sinus, and by no means as slender as in *Pseudomys* and others.

In *Laomys* the squamosal sinus is broad, relatively widely open, and is margined on its lower side by a process, the thickness of which is about one-third of its length. Its parieto-squamosal suture is well angled.

The considerable difference in the forms of the squamosal sinus in *Zyzomys argurus* and in *Laomys pedunculatus* is one of the reasons why I have felt uncertain of the advisability of merging them into one genus, as advocated by Ellerman, and have retained them as subgenera.

Mesembriomys presents much the same form of sinus as that of *Laomys*, shallow, rather wide, the lower process of the squamosal relatively stout (three to four times as long as broad), but the sinus is filled by intruding bone from the mastoid and the occipital, leaving almost no opening to the brain cavity. The suture separates the squamosal and is relatively straight.

In *Conilurus penicillatus* a condition ap-

proaching that of *Zyzomys argurus* can be seen, but the mouth of the sinus is still open. The width of the sinus slightly exceeds the width of the lower retaining bar. It is open to the brain cavity. The suture of the squamosal with the parietal is outwardly bowed, as in *Notomys*.

None of the six genera of Hydromyinae studied exhibits any trace of a post-squamosal sinus such as is prevalent in many genera of Australian Murinae.

ZYGOMATIC PROCESS OF MAXILLA AND ZYGOMATIC PLATE

As with the previous comparisons, I have taken *Rattus* as a basis for comparison, even though I doubt that it is truly primitive. It serves, however, as a fixed point of departure. The zygomatic process of the maxilla is slender and deep. The zygomatic plate is moderately broad, and its anterior edge sweeps forward and downward to merge with the maxillary wall of the rostrum a little above the anterior part of the palate. The plate masks a rather deep ante-orbital notch. The majority of modern murine genera display a substantially similar structure, but there are exceptions. Minor variations relate to the degree of slope of the anterior edge of the zygomatic plate and to its width from front to back.

In some of the "Australian genera" there exists a strong tendency for the basal portion of the zygomatic process of the maxilla to become exceptionally broad from the inside to the outside of the orbit and very flat on its superior surface. This condition is present in *Conilurus* and *Notomys*.

As regards the zygomatic plate the same group of genera tends to develop a forwardly projecting, spine-like extension of the top of the plate, coupled with a concave (instead of convex or straight) anterior margin at the middle and lower portions of the plate. In some *Pseudomys*, *Notomys*, and *Mastacomys* this pointed and excavated shape is conspicuous. In others, such as *Mesembriomys* and *Zyzomys*, it is like that of *Rattus*. The ante-orbital notch remains strongly developed in all except *Hyomys* and *Macruromys*. In the latter a condition approximating that of *Hydromys* (beyond) is present.

A somewhat similar but, I think, independ-

ently evolved modification of the zygomatic plate appears in most Hydromyinae. In all genera but *Xeromys* the plate is not only excised in front much as in *Notomys*, but is also so greatly narrowed and reduced anteriorly that no shoulder such as is seen in *Rattus*, enclosing the ante-orbital notch, is present. In the aquatic Hydromyinae also a tubercle at the base of the plate is present. There is no special modification of the zygomatic process of the maxilla in the Hydromyinae.

PALATE

Several features are of importance in studying the palate of Australian Muridae. They include the relationships of the premaxillae and maxillae to the incisive foramina; the shape of the incisive foramina and their extent in relation to the molars; the shape of the posterior part of the palate in terms of the molars (whether wide with the molars small, or narrow with the molars large); convergence or divergence of the molar rows; the relationships of the maxillae and the palatines and the position and outline of their sutural contact; the posterior palatal foramina; the extent of the palate backward beneath the mesopterygoid fossa; and the presence or absence of a median spine.

In *Rattus*, only a small part of each incisive foramen is contained in the premaxilla. The anterior part of the septum between the incisive foramina is slightly inflated; the posterior part is slender and compressed. The form of the incisive foramina varies with species groups, as do the positions of the maxillo-palatine sutures and the back of the palate. The intermolar palate is neither very broad nor very narrow. The posterior foramina are very small (0.1 mm. in length). The back of the palate extends well behind the back of m^3 , and there is a blunt median spine.

The Hydromyinae differ from *Rattus* in having the greater part of the incisive foramina contained in the premaxillae, and the premaxillary part of the septum (about seven-eighths of the total length of the septum) considerably inflated. The incisive foramina are in general broad and short. The intermolar palate is rather broad, with

the transverse maxillo-palatine suture level with the middle of m^1 . Posteriorly the palate reaches well behind m^3 (in *Leptomys*). The same conditions apply in *Hydromys* and *Parahydromys*. In the latter the palatine bones have become rather wider in proportion to the bordering maxillary parts.

The same type of palate as that in the Hydromyinae is found in *Macruromys*, provisionally kept in the Murinae, except that the molar tooth rows are each preceded by a sharp ridge bordering the premolar palate. *Anisomys* and *Pogonomys* agree in regard to the enclosure of the major part of each incisive foramen in the premaxilla and also in the considerable degree of inflation of the inter-foraminal septum internally. *Anisomys* displays the ante-molar ridges found in *Macruromys*, but the maxillo-palatine suture is level with the back of m^1 . In *Pogonomys* the palate is somewhat narrowed by approximation of the molar tooth rows, and its posterior lies in front of a line joining the backs of m^{3-3} . In *Hyomys* the premaxillae contain about three-fifths of each incisive foramen, and the septum is strongly inflated internally. The incisive foramina are very short, as is the case in *Macruromys*, *Pogonomys*, and the Hydromyinae. The molar palate is, however, specialized—deeply channeled and greatly narrowed, in part by encroachment of the extremely large molars; even in quite young specimens the maxillo-palatine sutures are obliterated. The back of the palate is level with the first loph of m^3 , and its extreme rear is thickened by downwardly projecting bony masses. There is a small post-palatal spine. In *Mallomys* the incisive foramina are shared nearly equally by the premaxillae and the maxillae, the former, however, still accommodating slightly more of the foramina than the latter. The suture separating the swollen anterior part of the septum from the compressed posterior part is also near the central line of the foramina. The foramina themselves are much larger than those of *Hyomys*. The molar palate, like that of *Hyomys*, shows great narrowing, with the very large molars of either side close together. As in *Hyomys* the maxillo-palatine suture is completely

ankylosed. The back of the palate terminates as a $\wedge$ -shaped reentrant without a spine.

In *Pseudomys*, *Zyzomys*, *Conilurus*, *Leporillus*, *Mesembriomys*, and *Notomys* the anterior part of the palate is much closer to that seen in *Rattus*. The incisive foramina are chiefly contained in the maxillae, and they often extend backward to or behind the level of the fronts of m^{1-1} . The position of the septal suture varies. In *Pseudomys higginsi* it is near the middle, as in *Rattus*. The same is true in *Zyzomys*, *Mus*, *Conilurus*, *Notomys*, and *Leporillus*. In *Mesembriomys* it is near the posterior end of the septum. The premaxillary part of the septum is inflated as in *Rattus*. The posterior part is often excessively slender. The molar palate is uniform and little modified from the condition found in *Rattus*. In *Leporillus* it terminates between m^{3-3} . In the anomalous *Lorentzimys* (placed only provisionally with the foregoing genera) four-fifths of the rather short incisive foramina are contained in the maxillae, but the posterior part of the septum is definitely thick (compare *Pseudomys*, *Zyzomys*). Posteriorly the palate extends far behind m^3 , much as in *Mus*. In *Mastacomys* extreme narrowing of the palate analogous to the condition in *Hyomys* and *Mallomys* is found.

In *Uromys* and *Melomys* the rather short incisive foramina are contained almost equally in the premaxillae and maxillae. The swelling of the anterior portion of the septum is considerably greater than in *Rattus norvegicus*, and the posterior part is also somewhat stouter (slender in some *Melomys*). There is no approximation of the molar tooth rows. The transverse maxillo-palatine suture is slightly behind the contact levels of m^{1-1} and m^{2-2} . The position of the back of the palate varies. It is usually just behind m^{3-3} . In *Xenuromys* the entire septum is extremely thick, reminding one of *Macruromys*; the palatines are thin and full of minute perforations, their sutures with the maxillae slightly anterior to the back of m^{1-1} ; the back of the palate is between m^{3-3} . The palate in *Pogonomelomys* agrees generally with that of *Melomys*.

DISTRIBUTION

In table 1 the rodent genera are set forth in terms of altitudinal and geographical distribution regardless of whether they appear to be actively evolving or not. The most striking fact revealed is the very large number (18) of genera that occur in the rain forests and uplands of New Guinea; and of those, no fewer than 16 genera inhabit midmontane or upland country. Again, of those 16 genera 10 live at 10,000 feet or higher, though only two are endemic there.

Endemism in this group of genera is greatest (four genera) in the zones between 2000 and 10,000 feet. In Australia, with Tasmania, the "Australian genera" tend to be quite widespread, including those not actively speciating. The primary Australian group is that inhabiting the dry to semi-desert interior. This group comprises no fewer than 10 genera of Australia's total of 13. Five of those 10 are endemic to the interior, *Pseudomys* and *Leggadina* having represen-

TABLE 1
DISTRIBUTIONS OF RODENT GENERA OF NEW GUINEA AND AUSTRALIA COMPARED

New Guinea (with Solomons)						Australia (with Tasmania)							
	Mountains	Midmontane	Forested Lowlands	Grasslands of south New Guinea	Solomons	Queensland Mountains	Queensland Lowlands	New South Wales and East Victoria	Tasmania	Central Arid Country	Arnhemland	Southwestern Australia	
<i>Leptomys</i>		x	x										
<i>Paraleptomys</i>	x	x											
<i>Pseudohydromys</i>	x	x											
<i>Microhydromys</i>		x											
<i>Xeromys</i>							x						
<i>Baiyankamys</i>	x												
<i>Parahydromys</i>	x	x											
<i>Hydromys</i>	x		x										
<i>Crossomys</i>		x					x	x	x	x	x	x	
<i>Pseudomys</i>													
<i>Leggadina</i>								x	x			x	
<i>Lorentzimys</i>		x	x				x			x	x		
<i>Leporillus</i>													
<i>Mastacomys</i>										x			
<i>Notomys</i>								x	x				
<i>Zyzomys, Laomys</i>										x		x	
<i>Mesembriomys</i>						x	x						
<i>Conilurus</i>				x			x			x	x		
<i>Mallomys</i>	x	x											
<i>Hyomys</i>	x	x											
<i>Macruromys</i>		x											
<i>Anisomys</i>		x											
<i>Pogonomys</i>		x	x										
<i>Xenuromys</i>			x										
<i>Melomys</i>	x	x	x	x	x	x	x	x		x	x		
<i>Uromys</i>		x	x		x	x	x						
<i>Pogonomelomys</i>	x	x	x										
<i>Rattus</i>	x	x	x	x	x	x	x	x	x	x	x	x	
Totals	10	16	9	3	3	4	8	5	4	9	7	4	

tatives in Tasmania or in the eastern coastal strip of Australia. Markedly local endemism appears only in the case of *Xeromys*, a derivative of the Papuan Hydromyinae. Branches of both *Melomys* and *Rattus* have become adapted to the dry interior environment though not to areas of maximum aridity. The extreme southwest, though relatively fairly wet, possesses no endemic genera. The distribution of *Hydromys* is governed chiefly by the presence of water courses and swamps and its appropriate food. It is little affected by types of plant cover.

When the present distribution diagram of rodents is compared with one that I prepared (Tate, 1948, pp. 255-258) for the Macropodidae, considerable contrasts are to be noted. The first is the much higher degree of endemism in New Guinea. Next comes a marked lack of concentration of genera in eastern Queensland, contrary to the condition prevailing in the macropods. The principal similarity lies in the considerable number of distinctive genera, both rodent and marsupial, existing at present in the southern half of Australia and extending northward for various distances. Invaders from Papua into Cape York and down the east coast comprise two rodent genera (*Melomys* and *Uromys*) against one macropod genus (*Dendrolagus*). The reverse colonizers of the Papuan grasslands from Australia include *Conilurus* and a branch of *Rattus*, compared with two macropods.

If the distribution of these same rodents is considered by natural groups of genera it is seen, first, that the Hydromyinae are predominantly Papuan, even though *Hydromys chrysogaster* also extends through most of the river systems of Australia and Tasmania; second, that the "Australian genera" (*Pseudomys* to *Conilurus*), with one possible exception (*Lorentzimys*), form a distinctively Australian lowland to mid-montane adaptive radiation; third, that the next five genera, *Mallomys* to *Pogonomys* (all *incertae sedis*), each of which may be a survivor of a once highly distinctive division of the Murinae, are wholly Papuan and that three of the five (*Mallomys*, *Hyomys*, and *Anisomys*) are in my opinion monotypic; fourth, that the *Uromys* group of genera (*Xenuromys*, *Melomys*, *Uromys*, and *Pogonomelomys*) is primarily Papuan, but shows a limited invasion of eastern Australia by two of the several groups of *Melomys* and one of the species of *Uromys*; fifth, that of the two endemic divisions of the genus *Rattus* the mainly forest-dwelling *assimilis* division occurs throughout forested Papua and the coastal fringes of Australia, while the mainly open-forest and grasslands-inhabiting *lutreolus* division is primarily Australian, with one species (*gestri*) invading the grasslands of south New Guinea and the Port Moresby area. (See figs. 1 and 2.)

PHYLOGENY AND EVOLUTION

The marked distinctness from one another of the Murinae found in Australia and New Guinea at once claims one's attention. Leaving aside the comparatively recent *Uromys-Melomys* complex and *Rattus*, the number of markedly distinct basic generic types native to each great island is very different. There are five such types in New Guinea, only one in Australia. Also more of the generic groups of New Guinea than of Australia are either monotypic or limited to two or three species.

The genera *Rattus*, *Melomys*, and *Uromys*, found on both islands, seemingly represent a later arrival than any of the foregoing. *Melomys* and *Uromys* (excluding the related

GENERIC GROUPS OF MURINAE OF AUSTRALIA AND NEW GUINEA

Distinctively Australian	Distinctively Papuan
The <i>Pseudomys</i> complex (including <i>Leporillus</i> , <i>Mastacomys</i> , <i>Notomys</i> , <i>Zyzomys</i> , <i>Mesembriomys</i> , and <i>Conilurus</i>). <i>Lorentzimys</i> of New Guinea may be a very early offshoot of this complex	<i>Mallomys</i> (possibly with Philippine affinities) <i>Hyomys</i> <i>Macruromys</i> <i>Anisomys</i> <i>Pogonomys</i>

monotypic Papuan *Xenuromys* and scendant *Pogonomelomys*) have, I think, undoubtedly developed in Papua and thence have colonized Queensland. The genus *Rattus* has de-

veloped one line of radiation in Australia (the *R. lutreolus* division), with Pleistocene invasion of southern Papua, and another radiation in Papua (the *R. ruber-leucopus-assimilis* division) which has extended in more than one Pleistocene wave into many parts of Australia.

No obvious intergeneric relationships can be perceived in the fauna of New Guinea. But the genera forming the *Pseudomys* complex of Australia, the suggested phylogeny of which is shown beyond, have been linked together in this paper as one single group of genera derived from a single Australian ancestor for the following reasons:

1. The tendency to modify the sphenoid and optic foramen to a common plan.
2. General similarity, including often great shallowness, of the ectopterygoid fossae.
3. Specialized condition of the posterior process of the squamosal (the tympanic hook).
4. Characters of the zygomatic process of the maxilla, emphasized in *Conilurus* and *Notomys*.
5. The reduction of the size of the coronoid process of the mandible.
6. The forward-projecting spine of the zygomatic plate commonly developed.
7. Partial fusion of the labial row with the median row of upper molar cusps.
8. In certain genera, development of postero-internal cusps of m^1 and m^2 .

Lack of well-developed external (labial) cusps (item 7) is probably to be considered of basic importance in all cases. This condition can mean either that the Australian Murinae are remnants of a remote murid ancestry that began with only two rows of cusps (i.e., a cricetid ancestry), in which case *Rattus* and others with three rows of cusps are specialized; or that the Australian genera form a group derived from a *Rattus*-like ancestor in which the labial cusps have become obsolete. If Simpson (1945, p. 208) is right in viewing the Murinae as descendants of cricetid ancestors, three-ranked murine teeth should be derived from two-ranked ancestral cricetid teeth, and those Australian genera that show an intermediate condition (labial and mesial ranks of cusps annectant) may then be the descendants of ancestors which were also in a transitional condition and arrived in Australia very early.

It is obvious that anatomical evidence can be conflicting when it is applied to the determination of intergeneric relationships. Almost certainly some of the resemblances to be found in Australian Muridae are manifestations of parallel or convergent evolution. The similarity of the fenestration of the basis cranii in *Notomys* and *Conilurus* is striking. But despite this open structure, the molars of *Notomys* lack postero-internal cusps, while those of *Conilurus* have them well developed. The latter condition seems to be more important. The open structure of the skulls in these rodents may be a weight-removing condition correlated with jumping methods of locomotion, incipient yet in *Conilurus* but fully developed in *Notomys*.

The Hydromyinae are usually classified as a subfamily of the Muridae, yet if the Muridae themselves were derived, as Simpson (1945, p. 205) suggests, from cricetid ancestry, the Hydromyinae may well have been similarly and independently derived. A comparison of the molars of a relatively unspecialized hydromyine such as *Leptomys* with those of *Mesocricetus* makes such a dental transition appear fairly reasonable; and, for what the facts are worth, further agreement can be found in the region of the zygomatic plate and in the inclusion of the major parts of the incisive foramina within the premaxillae, rather than in the maxillae as in *Rattus*. In other respects, particularly those relating to its fossorial habits (modified feet and tail), *Mesocricetus* stands far apart from the less specialized cricetines.

In conclusion, then, seven distinct ancient rodent types comprise the fauna of New Guinea and Australia, the genus *Rattus* and the *Uromys* complex being regarded as more recent. They are the *Pseudomys* complex, *Mallomys*, *Hyomys*, *Macruromys*, *Anisomys*, *Pogonomys*, and the Hydromyinae. There is no present clue to their ancestry, except in the cases of *Mallomys* and the Hydromyinae which have possible relatives in the Philippines.

The list immediately following shows the degree of speciation and subspeciation achieved in the native rodent genera of Australia and New Guinea. Comments on it are made beyond.

	SPECIES	SUBSPECIES	EXCESS OF SUBSPECIES OVER SPECIES
Hydromyinae			
<i>Leptomys</i>	1	3	2:1
<i>Paraleptomys</i>	2	2	0
<i>Pseudohydromys</i>	2	2	0
<i>Microhydromys</i>	1	1	0
<i>Xeromys</i>	1	1	0
<i>Baiyankamys</i>	1	1	0
<i>Parahydromys</i>	1	1	0
<i>Hydromys</i>	3	8 ^a	5:3
<i>Crossomys</i>	1	1	0
Murinae			
<i>Pseudomys</i> (<i>Pseudomys</i>)	7	10	3:7
<i>Pseudomys</i> (<i>Gyomys</i>)	8	10	2:8
<i>Pseudomys</i> (<i>Thetomys</i>)	6	7	1:6
<i>Leggadina</i>	5	9	4:5
<i>Lorentzimys</i>	2	2	0
<i>Leporillus</i>	3	3	0
<i>Mastacomys</i>	1	1	0
<i>Notomys</i>	12	16	4:12
<i>Zyzomys</i> (<i>Zyzomys</i>)	1	1	0
<i>Zyzomys</i> (<i>Laomys</i>)	2	2	0
<i>Mesembriomys</i>	2	4	2:2
<i>Conilurus</i>	2	4	2:2
<i>Mallomys</i>	1	3	2:1
<i>Hyomys</i>	1	3	2:1
<i>Macruromys</i>	2	2	0
<i>Anisomys</i>	1	1	0
<i>Pogonomys</i> (<i>Pogonomys</i>)	3	3	0
<i>Pogonomys</i> (<i>Chiruromys</i>)	4	4	0
<i>Xenuromys</i>	1	1	0
<i>Melomys</i> (white-toothed)	2	2	0
<i>Melomys</i> (<i>levipes</i> division)	7	38	31:7
<i>Melomys</i> (<i>rufescens</i> division)	6	26	20:6
<i>Uromys</i>	7	12	5:7
<i>Pogonomelomys</i>	5	7	2:5
<i>Rattus</i> (<i>exulans</i> division)	3	10	7:3
<i>Rattus</i> (<i>assimilis</i> division)	9	40	31:9
<i>Rattus</i> (<i>lutreolus</i> division)	8	25	17:8

^a Six races of one species.

The extent of present-day evolution in the Muridae of the Australian region has been examined with the aid of the foregoing table, in which are shown the number of species and subspecies in each generic or subgeneric group, and in the right-hand column the excess of subspecies over species. It can be seen at once that 18 of the 36, or 50 per cent of the groups comprising the fauna, are monotypic and appear to be stationary so far as concerns active evolution. Only five groups (*Rattus exulans* is included here

because of its extensive extraterritorial subspeciation) have substantially more subspecies than species, and those five groups are restricted to two genera, *Melomys* and *Rattus*. The remaining 16 groups, in which the excess of subspecies runs only to two or three times the number of species, can be thought of as evolving slowly and conservatively. In the single case of *Hydromys chrysogaster*, with six subspecies, the forms are very poorly differentiated despite the enormous and varied range of the species,

so that species too is probably adapting itself quite slowly.

In some instances (*Pseudomys*, *Notomys*, and *Pogonomys*) the number of species already evolved is rather large, while the number of races is relatively small. This would seem to suggest that after a period of active evolution in the geological past and after each form had perfected its relationship to its ecological niche, the genus in question settled down to a minimum of variation.

Of the nine genera of the Hydromyinae, *Leptomys* and *Hydromys* alone show slight signs of evolutionary activity. Only two of the genera, *Xeromys* and *Hydromys*, occur in Australia. The former is seemingly a relict genus found thus far only near Mackay on the east coast of central Queensland. Several of the Papuan genera dwell at middle or high altitudes on the central mountain system of New Guinea and are also relicts. The subfamily appears to be very old, relatively stable, and to have undergone considerable speciation (leading to the modern genera) in New Guinea in the past.

Among the Murinae shown in the table, the 12 genera from *Pseudomys* to *Conilurus* inclusive represent, in my opinion, an adaptive radiant evolution from a single ancestral type which may well have been something like *Pseudomys*. Several primary lines of adaptation are apparent: reduction in size and weight led to mouse-like forms like *Leggadina*, and increase in size to *Leporillus*. In *Mastacomys* came a thickened body form, with enlargement and modification of the molars. Leaping adaptations in the form of much lengthened feet and tails resulted in the development of *Notomys*. A single branch, *Lorentzimys*, possibly moved into Papua and became specialized in that its molars are now exceedingly reduced in size and its interorbital region is exceptionally wide. In the last four groups, *Zyzomys* to *Conilurus*, postero-internal cusps are present on the upper molars. *Zyzomys* and *Laomys* remain small; *Conilurus* is larger, with elongated feet; and *Mesembriomys* is moderately to very large and completely scansorial.

The next six genera (*Mallomys* to *Chiruromys*) may well be designated *incertae sedis*, for they are not only very distinct

from one another but have few or no close living relatives. All are Papuan and none reaches Australia. The first four are moderately large to very large rats. *Mallomys* and *Hyomys* are outstandingly the giants of the Australian rats. Though these two genera are extraordinarily alike externally, their skulls and teeth proclaim them far apart from each other. *Mallomys*, as pointed out elsewhere, may be related to the Philippine *Crateromys*. *Macruromys* and *Anisomys* both resemble *Uromys* superficially. *Macruromys*, with certain hydromyine characters, possesses molars which are perhaps secondarily simplified and greatly reduced in size; *Anisomys* has exceptionally compressed lower incisors and molars, with transverse laminae analogous in form to those of the Gliridae. *Pogonomys* and its subgenus *Chiruromys* are completely arboreal. They have long, prehensile tails, prehensile hands and feet, large eyes, and broadened heads, with short rostra.

The final series of genera, *Xenuromys* and *Melomys* to *Rattus*, is, I believe, a more modern portion of the Australian-New Guinea Muridae, though at least one genus, *Xenuromys*, branched off by itself and became specialized. It too seemingly stopped evolving. *Pogonomelomys*, wholly Papuan, developed the tail as an upwardly prehensile organ like that of *Pogonomys*. *Uromys* with its derivatives branched off from ancient *Melomys* and considerably increased its size and weight. Its headquarters was New Guinea, but it also early reached the Solomon Islands where several distinct types developed. It entered only the northeast corner of Australia. *Melomys* in New Guinea speciated very freely. Both mainly terrestrial and mainly scansorial species appeared, though in practice all climb easily and readily. The genus populated most of the islands off New Guinea and penetrated farther into Australia than did *Uromys*, going west to Arnhemland and south along the east coasts to northern New South Wales. I agree with Ellerman that *Melomys* and its relatives must originally have branched off the stem leading to *Rattus*.

The indigenous *Rattus* of Australia and New Guinea belong to three main groups, two of which, the *assimilis* and *lutreolus*

divisions, can be thought of as endemic to the Australian region, though the third, the *exulans* division, is mainly exotic and so

should be considered quite a newcomer from Malaysia. Both the endemic divisions have speciated freely.

AUSTRALIAN GEOLOGICAL HISTORY IN RELATION TO THE RODENTS

The geological and climatic history of the Australian continental mass has been examined by many workers, among whom should be mentioned Taylor (1919, 1940), Brooks (1922), Kendrew (1927), David (1932), Daly (1934), Keble (1947), Gentilly (1947), and Umbgrove (1947). David and Brown (1950) have given a concise historical review of Australian geology.

Towards the end of the Pleistocene the general Australian climate was considerably drier than it is today, but in the middle and early Pleistocene several markedly cold pluvial periods, possibly contemporaneous with the several polar glaciations, interrupted by warm interglacial periods, existed. The glaciations, in New South Wales and Tasmania, were of varying intensity. During the existence of each the cold rain belt, now found mostly south of the continent, moved northward, so that in the Australian winter months reliable rains fell in southern Australia across the entire width of the land as far north as latitude 30° S., and a long extension of that rainy zone reached northward into Queensland along, and inland from, the great dividing range (Taylor, 1919, fig. 2e; Keble, 1947, fig. 1). At the same period the belt of maximum aridity moved northward from its present position at latitude 35° S. to the latitude of Derby, and even farther north (nearly to Darwin) in Australian Pleistocene summer (Taylor, 1919, fig. 2). This condition of the climatic belts perhaps prevailed more or less completely during each glacial epoch, with a partial return to the climate of today during each interglacial. Whitehouse (1940, fig. 14) indicates two wet periods, accompanied by increased rainfall in Queensland during the Pliocene. In his view, a time of aridity existed at the close of the Pliocene and before the onset of the glaciations.

Many millions of years earlier, before Tertiary time (David, 1932), a Lower Cretaceous sea covered the present "great artesian basin" from the Gulf of Carpentaria

to Spencer Gulf and divided Australia into a large western island composed mostly of pre-Cambrian rocks and a small eastern island formed by the successive revolutions and periods of vulcanism that went into building the present eastern mountain systems. This sea deposited the marine clays of the artesian basin that now cover the water-holding Jurassic sands. There was a minor glaciation in New South Wales. The land rose slightly, and the Cretaceous sea was replaced by huge lakes. Next, thrusts from the east further crumpled the coastal ranges. New Guinea at that period was apparently represented by only the northern portion of its present land, the Cyclops, Prince Alexander, and Adelbert Mountains, with east and west extensions. South of it a huge sea some 300 miles across from the ancient New Guinea coast to the granites of Mabaduane and the present tip of Cape York was being steadily filled with marine deposits. This great syncline endured through the greater part of Tertiary time.

In the Oligocene, subsidence accompanied by extensive vulcanism prevailed in the southeast of Australia, and in the Miocene came marine transgressions of the Murray Basin and the Nullarbor Plains where great thicknesses of limestone were laid down. From Miocene to Pleistocene time the newer (southern) parts of the great New Guinea mountain chain were folded by thrusts possibly from the north to heights as great as 15,000 feet. This mountain building was completed in time for the glaciers to leave their marks on the summits.

David believed that a Jurassic land connection with New Zealand has existed, which disappeared at the beginning of the Cretaceous. He also suggested for this epoch the upfolding of the Tasmanides, a chain of peaks 100 miles east of Australia, which rise 16,000 feet above the present Pacific floor and have their tops within 500 fathoms of the surface.

Such, in very condensed form, has been David's reconstruction of the Mesozoic and

Tertiary periods of Australia. The impact of such enormous changes on the mammals must have been very great. Successive climatic oscillations must have driven survivors into many different geographical ranges, as various parts of Australia successively became habitable or uninhabitable. In early to middle Tertiary, only marsupials, monotremes, and bats can have been present, if Simpson's postulate of the Miocene as the time of origin of the Muridae from proto-Cricetidae is correct. There may still have been some fairly generalized monotremes in Australia in addition to earlier members of the lines that culminated in the Ornithorhynchidae and Tachyglossidae. All the major divisions of the Australian Marsupialia should have been in existence by mid-Tertiary time.

The murines and hydromyines probably began drifting across the island "stepping stones" from Asia (Simpson, 1940) almost as quickly as they evolved. The high degree of segregation displayed by modern Papuan and Australian rodents suggests that those reaching New Guinea and Australia stayed in their respective new environments. It would seem, too, that New Guinea was slightly more accessible for them than Australia, since there appear to be at least five old, markedly separate stocks in the former, and but one (which, however, evolved extensively) in Australia. This statement relates to early-arriving murines, not to *Rattus* and the *Uromys* group of genera, which probably came in later. The hydromyines, which comprise three times as many Papuan genera as Australian, also appear to have reached New Guinea early and thence at a later period to have crossed to Australia.

In summary, by late middle Tertiary a limited number of quite distinct types of rodents had reached Australia and reached New Guinea and remained in each area with virtually no interchange.

Late Tertiary brought further geological disturbances: the completion of the uplift of the New Guinea Cordillera, with elimination of the south New Guinea sea; and the Pleistocene glaciations, with lowering of the ocean levels to permit wide land connections across the present Torres Strait. Each of these great events induced further climatic

changes, and the cessation of the glacial periods was accompanied by still others, the last of which was the still present arid cycle. Mountain building in New Guinea, actually an exceedingly slow process, would have permitted the mountain-inhabiting rodents of the old proto-New Guinea to colonize the new areas progressively as they rose. For that to take place, the lowland species must either have stayed near the advancing southern shore ahead of the uplift or have gone around the western and eastern ends of the Cordillera in order to reach the new southern lowlands. In either case two phenomena probably occurred: first, a few relatively static types failed to colonize the new lands (and probably some became extinct); second, among the active colonizers entering newly available territory, mutation should have become accelerated and a number of subspecies and perhaps species should have evolved.

In southeastern Australia and Tasmania most, if not all, species should have been forced out of the progressively less hospitable glaciated areas into the at present arid east center which, owing to the greater precipitation and denser plant cover of that time, possibly became a suitable refuge for them. Then, with the melting of the ice caps the fauna must have spread towards the southeast once more. The several oscillations and migrations in that area should have allowed or induced additional mutations. As there are no indicator fossils, we can look only for suggestions on the Pleistocene distributionary patterns from the actual distributions of modern forms.

OLD NEW GUINEA AND MODERN NEW GUINEA

HYDROMYINAE: *Leptomys elegans*, a monotypic foothill to lowland species widespread throughout the island, has produced a geographical race in the lower Fly River. *Parahydromys* and *Crossomys*, foothill to mid-montane genera, are monotypic and stable. *Hydromys chrysogaster* is distributed throughout the river systems of New Guinea, Australia, and Tasmania. Such an extensive dispersal was probably completed during the extremely long interglacial between Mindel and Riss time (Daly, 1934, figs. 22-23;

David, 1932, pp. 94, 175). But *Hydromys habbema*, its close ally *Baiyankamys*, and *Pseudohydromys* are confined to the summits of the New Guinea Cordillera. *Paraleptomys* occurs on the old land, *P. wilhelmina* on the north slopes of the new mountains, and *P. rufilatus* on the north coastal Cyclops Mountains. *Microhydromys* is a lowland species in the synclinal east-west valley of the Idenburg River between the north coastal and the central ranges.

Xeromys, today found in the Mackay area of Queensland only, represents a localized invader from New Guinea during middle Pleistocene time or earlier.

To summarize: Two species of Hydromyinae invaded the lowlands of south New Guinea and entered Australia, one being now distributed almost throughout the island except in the desert center, the other strictly localized on the coast of central Queensland. Of the rest, seven species in five genera are not known on the south slopes of the central cordillera or in the southern lowlands, two genera are confined to the lower parts of the mountains on both the north and south sides, and a third, having nearly similar distribution, has invaded the forests fringing the lower Fly River. There is no evidence to show that any hydromyine originated in Australia and thence entered New Guinea.

MURINAE: Five main Papuan groups comprise the older indigenous genera, and the newer *Rattus* and *Uromys* (with its allies). Of the five old genera, *Mallomys*, *Hyomys*, and *Anisomys*, all monotypic though confined to the mountains, are found on the north and south slopes equally. *Macruromys*, with two quite distinct species, is found only north of the main range. Arboreal *Pogonomys*, with several species, is widely distributed and (like *Leptomys*) has colonized the tree fringes of the lower Fly River. In this genus two species have penetrated the new southern flat lands.

Rattus, *Uromys*, and *Melomys* with their allies differ from the "old genera" in having undergone extensive speciation. They thus appear as newcomers in an environment offering little competition and ample numbers of ecological niches. *Rattus* possibly came to New Guinea later than the *Uromys* group, for the latter has had time to produce two

endemic offshoots, *Xenuromys* (monotypic) and *Pogonomelomys* (several species with prehensile tails). The two dominant genera of that group, *Uromys* and *Melomys*, have both invaded the Australian east coast strip. *Melomys* has penetrated to Arnhemland and to northern New South Wales. *Rattus*, now the dominant Asiatic-African genus, sent branches both to New Guinea and directly to Australia (the *R. lutreolus* division). Each has subsequently, and rather lately, crossed the Torres area to enter the territory, but not the environment, of the other.

OLD AND MODERN AUSTRALIA, INCLUDING TASMANIA

MURINAE: As stated before, there exists only one old, now widely diversified, line in Australia, in comparison with the five ancient types in New Guinea, with, partly sympatric with this line, the comparatively very recent, possibly Pleistocene, arrivals, the *Rattus lutreolus* division, the *Rattus assimilis* division, and the *Uromys* genera. The last two entered from New Guinea; the first (*lutreolus*) apparently crossed to Australia directly from the Sunda region.

The old Australian line, which I name collectively the "Australian genera," has evolved freely, producing among others such distinctive animals as the tree rats, *Mesembriomys*, the jumping or jerboa mice, *Notomys*, the broad-toothed rat *Mastacomys*, which inhabits the cold scrubs and swamps of Mt. Kosciusko and Tasmania, and the stick-nest rats, *Leporillus*. The group possibly reached Australia in Pliocene time, or certainly early in the Pleistocene, and reacted to the full impact of the Pleistocene climatic cycles. *Notomys* may well have accomplished much of its adaptation to desert conditions in the extreme north, a region that is shown by Taylor (1919, 1940) to have been in the belt of maximum aridity during the glaciations. Today, as the area of maximum aridity has moved southward, *Notomys* has traveled with it, and latitude 30° S. can be regarded as the parallel marking its distributional center.

The *Rattus lutreolus* division came perhaps in early to middle Pleistocene. One of its members, *R. lutreolus*, has already responded

TABLE 2
LATE TERTIARY HISTORY IN RELATION TO THE AUSTRALIAN RODENTS

Time	Rainfall and Climate	Topography	Australian Rodents Colonizing New Guinea	Papuan Rodents Colonizing Australia
Today	Slightly less arid	Sea level lower by about 30 feet from level 4000 years ago	Present-day distribution patterns suggest pronounced lack of early rodent interchange, as compared with marsupials. Endemism today very high	
4000 years ago (very late Pleistocene)	Extreme aridity	Sea level slightly higher than it is today (the Townsville shelf)		
8000 years ago	Increasingly arid	Torres Strait completely re-established	Last connection* with New Guinea: <i>Comiturus p. randi</i> of open country of north Australia into extreme south of New Guinea	Last connection with New Guinea: <i>Rattus leucopus</i> of forest and gallery woods of New Guinea into Cape York Peninsula
	Less humid			
Middle Pleistocene	At glaciation maxima came periods of unusual coolness, isothermal lines shifted northward, southern Australia had rainfall, arid belts restricted and displaced northward. Tropical rains probably little diminished. Doubtless interglacial periods when climate grew hotter and drier	Probably three broad connections between Australia and New Guinea, corresponding with glacial period of poles. Shelf from mouth of Fly River to Barrier Reef, and to present grasslands of Moresby area. Rivers entering Gulf of Carpentaria united with small ones flowing from southern New Guinea coast. Continuous gallery woods followed courses of all those rivers, giving more or less uninterrupted passage for <i>Phalanger</i> , <i>Uromys</i> , and <i>Melomys cervinipes</i> (ancestor)	Middle connection: <i>Rattus gestri</i> , open-country rat of northern Australia, into southern New Guinea and Moresby savannas via coastal shelf	Middle connection: <i>Melomys lutillus</i> group of open country and highlands of New Guinea into northern Australia to Arnhem land, south to Rockhampton. <i>Uromys caudimaculatus</i> , arboreal, of all New Guinea lowlands, north and south, to Cape York and as far south as Townsville
Early Pleistocene			Early connection: No evidence of rodent passage	Early connection: <i>Melomys cervinipes</i> , derived from New Guinea forest group of <i>Melomys</i> , to Cape York, Arnhem land, and south to northern New South Wales
1,000,000 years ago				
Pliocene	Two marked pluvial periods shown by Australian geologists	Pliocene syncline and sea over seas in South Australia, east of Spencer Gulf and over Nullarbor Plains		

* I do not mean to imply that there were no more, or no fewer, than three land connections.

to the southern climate and become the cool-water swamp rat of New South Wales and Tasmania, while its relations remain for the most part desert or open-country rats. One species, *R. gestri*, has entered, possibly during the last land connection, the grasslands of south New Guinea and Port Moresby.

The *Rattus assimilis* division came from New Guinea into Australia in two waves. An earlier rat (*R. assimilis*, with *greyi*), which crossed on what was possibly the penultimate land bridge, penetrated all eastern Australia and during the last pluvial period extended its range along the south coast to Western Australia, but did not reach Tasmania. A later rat (*R. leucopus*), crossing during possibly the last land connection, has merely filled the forested portions of Cape York.¹

¹ I omit the *R. exulans* division, the most recent of all wild rats, possibly introduced by primitive man.

Uromys and *Melomys* possibly entered Australia through the Torres region at much the same time as *R. assimilis*, and certainly prior to *R. leucopus*. *Uromys* never crossed the gap in the forests at the Burdekin River, but *Melomys cervinipes* reached both Arnhemland and New South Wales. Both are scandent forest types. The little group of *Melomys* to which *M. lutillus* belongs seems to prefer brushy, semi-open grasslands and small gullies penetrating grass country; it avoids the big rain forests. It, too, came before the last land bridge, for it has spread westward to Arnhemland and as far south as Rockhampton.

This brief account attempts to describe the effects of the Tertiary changes on the rodent fauna as deduced from the geographical distribution of its descendants today. I have tried to put the matter graphically in table 2.

TAXONOMY

SUBFAMILY HYDROMYINAE

DIVERGENCE of the primitive Hydromyinae from some ancestral murid or even cricetid, perhaps in southern Asia, was probably first indicated by dental changes involving development of the basined molars. Obsolescence of m_3^s , shortening of the rostrum, modification of the surface of the soles of the feet into the soles of aquatic type to be seen in *Hydromys*, and other adaptations for aquatic life must have ensued later in the evolution of the subfamily. In New Guinea the co-existence with *Hydromys* of related genera having normal foot pads and/or retaining the third molars makes it likely that such was the case.

Apparently the least specialized hydromyine genus at the present day is *Leptomys*.¹ This genus possesses the fully basined molars distinguishing the subfamily from the Murinae and also retains m_3^s . It possesses feet bearing normal sole skin, but its limbs are somewhat elongated, as though slightly adapted to leaping. The tendency to lose the last molars may well be present in *Leptomys*, however, because its near relative, *Paraleptomys*, in which no elongation of the legs and feet has developed, has already lost them. Moreover, the loss of m_3^s has been accomplished in all other genera of the subfamily and of m_3 in all except *Baiyankamys*.

With the trend towards molar obsolescence virtually established, the remaining genera show anatomically that further divergence subsequently took place. They show divergence on the one hand into shrew-like terrestrial animals of reduced size (*Pseudohydromys* and *Microhydromys*) and on the other into medium-sized to large aquatic or subaquatic animals (*Baiyankamys*, *Parahydromys*, *Hydromys*, and *Crossomys*). In these last the normally prominent ectopterygoid ridges are rounded off or flat, and nearly obsolete.

The zygomatic plate is excavated in front in most of the genera. It is almost as in *Rattus* in the genus *Xeromys* and is only partly modified in *Paraleptomys*.

¹ There is a bare possibility that *Macruromys* will ultimately be found to belong to the Hydromyinae. For the present I have kept it with the Murinae.

The skulls of *Pseudohydromys* and close allies are marked by lack of sharp constriction in the interorbital region. The interorbital width in these mice is as much as 34 to 38 per cent of the zygomatic width. True *Hydromys* on the contrary displays extreme interorbital constriction, the least interorbital width amounting to only 20 per cent of the zygomatic width. *Xeromys* has ± 30 per cent.

Xeromys, though its feet are unspecialized, exhibits certain affinities with *Pseudohydromys* and others with *Hydromys*. It perhaps marks the terminus of a separate, very ancient line, since it alone of all the genera, excluding some from the Philippines, retains the zygomatic plate in an unmodified *Rattus*-like condition.

The "hydromyine" rats of the Philippine Islands are possibly descendants of proto-hydromyines left along the ancient migration track from Asia to Australia. They have become independently specialized.

LEPTOMYS THOMAS

Leptomys THOMAS, 1897, Ann. Mus. Civ. Genova, vol. 18, p. 610.

A rather primitive genus of Hydromyinae with terrestrial pelage and habitat, and basined hydromyine molars, in which the molar number is not reduced from the murid $\frac{3}{3}$. It is specialized through the considerable elongation of the hind foot, which may function as an incipiently hopping organ. Mammary formula, 0-2=4.

The skull is narrow and elongate, the nasals exceeding the premaxillae. Interparietal well developed. Nasals extending behind a line joining the lacrimals. Incisive foramina short. Bullae small. Zygomatic plate narrow and slightly excised in front. Incisors slightly opisthodont. Molars of hydromyine type, though the cusps are better developed than in *Hydromys*, and m_3^s , reduced in size, are single-rooted.

TYPE: *Leptomys elegans* Thomas.

Leptomys elegans Thomas

The distribution pattern of *Leptomys* is still somewhat uncertain. *Leptomys elegans* occurs along the south side of the main ranges behind Port Moresby between 1200 and 5000

feet, ranging from the Astrolabe Range to Mafulu on the Angabunga River, but probably both the altitudinal and the horizontal ranges are greater. The headquarters of *L. ernstmayri* is the hill country of the Huon Peninsula, and *L. signatus* is known only from the lower Fly River. Rümmler (1938) records, as *ernstmayri*, a *Leptomys* from Arfak, 3000 feet, and one from Morobe, 6000 feet. The Archbold expedition did not obtain the genus in the Hollandia and Idenburg River areas, but it is probably widely distributed in midmontane country and in the lowlands (e.g., *signatus*).

***Leptomys elegans elegans* Thomas**

Leptomys elegans THOMAS, 1897, Ann. Mus. Civ. Genova, vol. 18, p. 610.

TYPE: Genoa (no number, locality, or date shown on label), fully adult female; mammae indicated as 0-2=4, collected by Loria. Loria collected in the Astrolabe Range behind Port Moresby.

MATERIAL: From two localities in the Astrolabe Range at about 1000 feet: Baruari, two; Sogeri, two. Also from Kagi, Moresby-Kokoda track, 5000 feet, two; and Mafulu, north of Port Moresby, two. Total, eight.

The dorsal color is a warm tawny, darker on the back, lighter on the sides. Under parts white or creamy to the roots of the hairs. Ears large, light fuscous. The hands and the slender elongate feet are thinly covered with white hairs. Tail fuscous above, flesh colored beneath. The tail scales, which are rounded, vary from eight to 13 per centimeter, depending upon age. Scale hairs three per scale and one and one-half scale lengths. Tail tip white for varying distances.

***Leptomys elegans ernstmayri* Rümmler**

Leptomys ernstmayri RÜMMLER, 1932, Das Aquarium, vol. 6, p. 135.

TYPE: Berlin, No. 42400 (field no. 770) from Ogeramngang, Saruwaged Mountains, Huon Peninsula, northeast New Guinea, collected February 20, 1929, by Ernst Mayr.

The fur is softer than that of *elegans*. The under parts are white. The foot is more slender, though this may be due to youth. The width at the base of the fifth metatarsal is 3.9 mm., in a large *elegans*, 5.7 mm.

In the type the molars show a small external cusp on the first lamina of m^1 and on the second lamina of m^2 .

***Leptomys elegans signatus* Tate and Archbold**

Leptomys signatus TATE AND ARCHBOLD, 1938, Amer. Mus. Novitates, no. 982, p. 2.

TYPE: A.M.N.H. No. 105792, adult female, from Sturt Island Camp, north bank of Fly River, near Fairfax Island, Western Division, Papua, sea level, collected October 12, 1936, by G. H. H. Tate.

MATERIAL: Three topotypes.

This form, besides displaying a large white patch on the forehead of each of the four specimens, is colored distinctly duller and grayer than is either *elegans* or *ernstmayri*. It averages somewhat smaller and has the hind foot shorter.

It is known only from the type locality.

PARALEPTOMYS TATE AND ARCHBOLD

Paraleptomys TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 1.

A genus related to *Leptomys* and with very similar skull, which, however, is specialized further than in *Leptomys* by the loss of m^3 as in most other Hydromyinae. The feet are normal scampering structures showing no sign of the elongation that gives *Leptomys* the appearance of an incipiently saltorial animal.

TYPE: *Paraleptomys wilhelmina* Tate and Archbold.

***Paraleptomys wilhelmina* Tate and Archbold**

Paraleptomys wilhelmina TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 1.

TYPE: A.M.N.H. No. 150512, adult male, from 9 kilometers northeast of Lake Habbema, north of Mt. Wilhelmina, Netherlands New Guinea, altitude 2800 meters, collected October 15, 1938, by W. B. Richardson.

MATERIAL: Nine kilometers northeast of Lake Habbema, 2800 meters, 43; Bele River, 2200 meters, five; 18 kilometers southwest of Bernhard Camp, Idenburg River, 2150 meters, seven; 15 kilometers southwest of same camp, 1800 meters, 23. Total, 78.

The color of the type is dark grayish brown, the back slightly darker than the sides. The under parts are dull white, with gray

bases. There is little more than a trace of the rufescence on the sides, which is so conspicuous in *rufilatus*. Hands and feet whitish. Tail gray above, white beneath, its tip white. Tail scales 14 per centimeter, scale hairs one scale length, whitish.

In the skull the zygomatic process of the maxilla is less flaring than in *Leptomys*, and m_2^3 are wholly obsolete.

This is a common species in the highlands of central Netherlands New Guinea between 6000 and 10,000 feet.

***Paraleptomys rufilatus* Osgood**

Paraleptomys rufilatus OSGOOD, 1945, Fieldiana, Zool., vol. 31, no. 1, p. 1.

TYPE: C.N.H.M. No. 54236, adult male, from Mt. Dafonsoero, Cyclops Mountains, northern Netherlands New Guinea, 4700 feet, collected April 21, 1945, by S. G. Jewett, Jr.

A considerably larger species than *wilhelmina*; especially characterized by its white throat and the reddish brown sides of the body. The foot length is 32 mm. (s.u.), against ± 30 mm. in *wilhelmina*.

The skull is generally larger than skulls of *P. wilhelmina*, particularly in regard to the width of the interparietal and the length of the palate. The bulla on the contrary is slightly shorter. The molar tooth row is only slightly longer.

There is a second specimen, a female, collected by Jewett the day before he took the type.

PSEUDOHYDROMYS RÜMMLER

Pseudohydromys RÜMMLER, 1934, Zeitschr. f. Säugetierk., vol. 9, p. 47.

A genus of very small, shrew-like hydromyines, larger than *Microhydromys*, having the molar series reduced to $\frac{2}{2}$ as in *Hydromys*. The habitus appears to be non-aquatic. The feet have definite pads and soles of terrestrial type and thus are unlike those of the aquatic *Hydromys* or *Parahydromys*.

The skull is somewhat flattened, the back of the braincase rather broad. Rostrum broad at the base. Nasals shorter than or even with premaxillae. Zygomatic plate narrow, excised anteriorly. Incisive foramina very short and broad, their ends rounded.

Back of palate with small spine extending about 0.5 mm. behind m^3 . Pterygoids low. Alisphenoid area somewhat inflated. Bullae moderately large. Upper and lower first and second molars of normal hydromyine basined type. Mandible with pronounced angular projection, the coronoid process short. The incisors are not grooved (as in *Microhydromys*).

TYPE: *Pseudohydromys murinus* Rümmler.

***Pseudohydromys murinus* Rümmler**

Pseudohydromys murinus RÜMMLER, 1934, Zeitschr. f. Säugetierk., vol. 9, p. 48.

TYPE: M.C.Z. No. 29904, adult male, from Mt. Misim, 7000 feet, near Morobe, northeast New Guinea, collected March 8, 1933, by H. Stevens.

The pelage of the type somewhat resembles that of *Blarina*, the color dark gray above, scarcely lighter beneath. Hands and feet gray. Tail dark gray, not paler beneath, longer than head and body. Scale rings 19 per centimeter, scale hairs about two scale lengths and three per scale. The type skull has the nasals extending to the level of the premaxillae. The zygomatic plate is provided with a distinct tubercle. The distance apart of the bullae is ± 2 mm.

No specimens other than the type are known.

***Pseudohydromys occidentalis*, new species**

TYPE: A.M.N.H. No. 150772, adult male, from Lake Habbema, north of Mt. Wilhelmina, Netherlands New Guinea, 3225 meters, collected August 8, 1938, by W. B. Richardson. Skin and skull in good condition.

GENERAL CHARACTERS: Externally very similar to *P. murinus* of eastern New Guinea but with the tail distinctly shorter than the head and body. Skull slightly larger. Nasals shorter than premaxillae, and about equal in length to diastemata. Muzzle behind incisors deeper and palate decidedly longer than in *murinus*. Bulla longer than, but tooth row subequal to, the respective structures in *murinus*.

DESCRIPTION OF TYPE: Pelage dark brownish gray with one or two flecks of white, possibly adventitious. Under parts scarcely paler. Ears thinly clad with blackish hairs. Hands, feet, and tail with whitish hairs. Tail rings

about 20 per centimeter, the hairs about one and one-half scale lengths.

Skull, besides the differential characters shown above, shows a tendency towards obsolescence of the interparietal (by extreme anteroposterior shortening; it is absent in A.M.N.H. No. 110326); a moderate post-palatal spine; proödont incisors, and scarcely excised zygomatic plate.

MEASUREMENTS: (Field): head and body, 101 mm.; tail, 90; hind foot (s.u.), 20; ear from crown, 8. Skull (laboratory): condylo-basal length, 24.7; basal length, 22.6; zygomatic breadth, 11.8; mastoid width, 10.1; breadth of braincase, 11.0; interorbital width, 5.6; interparietal, 5.9 by 1.3; length of nasals, 7.3; greatest width of nasals, 2.6; zygomatic plate, 1.4; palatal length, 13.0; distance between m^{1-1} , 2.8; incisive foramina, 2.2 by 1.6; length of bulla, 3.8; diastema, 7.9; m^1 plus m^2 , 2.7; m^1 , 1.9 by 1.1; m^2 , 1.1 by 1.1; mandible, greatest length (except incisors), 14.2; m_1 plus m_2 , 2.8.

REMARKS: Besides the type from Lake Habbema, 3225 meters, we have three from "seven km. northeast of Wilhelmina Top, 3560 meters" (a few miles south of the type locality), and one from the same region at 3600 meters. Thus the species appears to occupy a considerably higher environment than does *P. murinus* of Mt. Misim, 7000 feet, and a very much higher one than the smaller *Microhydromys richardsoni*.

MICROHYDROMYS TATE AND ARCHBOLD

Microhydromys TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 2.

The smallest known hydromyine, distinguished by the possession of grooved upper incisors. Molars reduced to $\frac{2}{3}$. Skull broad as in *Parahydromys*. Owing to the poor condition of the unique skull it is not possible to describe the posterior portion or to determine whether the interparietal tends to become reduced or is obsolete, as in *Pseudohydromys*. The muzzle and palate are short. Bullae proportionately large and close together. Ears unreduced. Feet not modified for swimming. A scampering, non-aquatic type of animal.

A genus seemingly of the lower mid-montane areas but hitherto known only from the mountain slopes bounding the Idenburg River on the south. It can be expected to ex-

tend to west and east for considerable distances at the level of 2000 to 3000 feet.

TYPE: *Microhydromys richardsoni* Tate and Archbold.

Microhydromys richardsoni Tate and Archbold

Microhydromys richardsoni TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 2.

TYPE: A.M.N.H. No. 152079, adult male, from near Bernhard Camp, Idenburg River, Netherlands New Guinea, 850 meters, collected March 16, 1939, by W. B. Richardson. The back of the skull is badly broken.

A gray-black species the size of a house mouse or smaller, the terminal centimeter of the tail white.

Still known to me from a single specimen.

XEROMYS THOMAS

Xeromys THOMAS, 1889, Proc. Zool. Soc. London, p. 248.

A hydromine genus of terrestrial or swamp habitus. The pelage and feet unmodified for aquatic life, but the basined molars reduced as in *Hydromys* to $\frac{2}{3}$. The feet are not elongated as are those of *Leptomys*.

The nasals have already achieved almost as great a degree of shortening as in *Parahydromys* and *Hydromys chrysogaster*, a condition distinctly foreshadowed in *Pseudohydromys*. The proödont character of the ungrooved incisors in *Pseudohydromys* is seen repeated in *Xeromys*. The zygomatic plate which resembles that of *Rattus* is unique among the Hydromyinae. The bullae are unreduced. The broad but very short interparietal resembles that of *Pseudohydromys*, when present.

TYPE: *Xeromys myoides* Thomas.

Xeromys myoides Thomas

Xeromys myoides THOMAS, 1889, Proc. Zool. Soc. London, p. 249.

TYPE: B.M. No. 87.10.31.2, young adult female in alcohol, the skull cleaned, from Port Mackay, northern Queensland, received from Dresden Museum (No. 1948a).

A second specimen (Sydney, No. M.6868) in alcohol, a male, also from Mackay, has been kindly lent me for study by Mr. Ellis Troughton, Curator of Mammals, the Australian Museum, Sydney.

The color of the type dorsally is now a dull brown; ventrally self-colored buffy white. The lips appear tumid but this may be due to absorption of alcohol. Eyes small; length of ocular opening, 3.2 mm. Breadth of ear, 9 mm. Vibrissae, 23 mm. Mammae, 0-2=4, somewhat recessed. Width of hind foot at fifth metatarsal, 3.8 mm. Tail with scales ill defined, annular wrinkles, the wrinkles 20 to 24 per centimeter. Hairs in threes, about four rings in length.

Skull with nasals comparatively short; interparietal wide and short (2.2 mm.); braincase full but unbroadened; zygomatic plate unemarginate but not much thrown forward; incisive foramina with anterior half within the premaxillae; bullae moderate in size, tapering gently to the Eustachian opening; mesopterygoid fossa rather narrow; posterior palatal foramen present, 0.8 mm. in length; no post-palatal spine; a masseteric tubercle slightly developed. Upper incisors yellow, lower incisors white (yellow in the male). Molars $\frac{2}{2}$, *Hydromys*-like.

It should be noted here that B.M. No. 87.10.31.4, formerly Dresden No. 381 (possibly a field number), collected by A. B. Meyer in 1859 in Celebes, which is marked *X. myoides*, is a quite different kind of rat.

The Sydney specimen, No. M.6868, is very like the type, but is slightly larger in nearly all dimensions. The ear, though small, is not much reduced and appears normal in character. The skull shows strongly proödont incisors, and the incisive foramina are somewhat longer than those of the type. Otherwise the similarity is very exact.

BAIYANKAMYS HINTON

Baiyankamys HINTON, 1943, Ann. Mag. Nat. Hist., ser. 11, vol. 10, p. 552.

A hydromyine genus distinguished from all others by the loss of m^3 , combined with retention of m_3 , by lateral compression of the rostrum, and by shortening of the palate. Feet with the three internal digits webbed as in *Hydromys*. Ear unreduced.

This genus appears to lead from forms with unmodified hydromyine dentition and a full complement of molars, such as we find in *Lepiomyys*, to the now more usual molar formula in which both the upper and lower third molars are no longer developed.

Baiyankamys is as yet known only from the top of the main cordillera of New Guinea at longitudes 147° to 148° E.

TYPE: *Baiyankamys shawmayeri* Hinton.

Baiyankamys shawmayeri Hinton

Baiyankamys shawmayeri HINTON, 1943, Ann. Mag. Nat. Hist., ser. 11, vol. 10, p. 552.

TYPE: B.M. (F. Shaw Mayer) No. 713, adult male, from Baiyanka, Purari-Ramu Divide, southeast Bismarck Range, northeast New Guinea, 6500 feet, collected by F. Shaw Mayer, June, 1940.

Color dorsally dark gray, below paler gray. Terminal one-fourth of tail white.

Hinton concluded that *B. shawmayeri* was externally much like *Hydromys habbema*, but that species has lost the lower last molar as well as the upper and thus is a true *Hydromys*.

In 1950 during a brief visit to London I examined the type. It is externally much like *Hydromys habbema*, but the skull has the rostrum much compressed (width above incisor, 3.6 mm.). The zygomatic plate measures only 1.6 mm. (For additional measurements, see table 5.)

HYDROMYS GEOFFROY

Hydromys GEOFFROY, 1804, Bull. Soc. Philom., Paris, vol. 93, p. 253 (*vide* Sherborn, 1927, Index animalium, p. 3076); 1805, Ann. Mus. Paris, vol. 6, p. 81.

Medium- to large-sized aquatic rats of the subfamily Hydromyinae, possessing dense, soft pelage, mammary formula 0-2=4, small ears, partly webbed hind feet, slightly tumid lips, and densely haired tail. The skull of *Hydromys* requires comparison chiefly with that of *Parahydromys*. These two genera, with *Crossomys* and *Baiyankamys*, are much larger in body size than the other hydromyine genera. In *Hydromys* the outline of the skull from above is fairly typically murid, though it is conspicuously shortened and broadened in *Parahydromys*. The braincase is full, low, and parallel-sided. Compared with *Rattus* its brain capacity is very great, particularly the occipital and mastoid portions, and the basioccipital is very wide. The intertemporal constriction extends far back on the frontals, as also in *Parahydromys*. The rostrum is normal (much broadened in *Parahydromys*), while

the nasals in comparison with the premaxillaries are extremely short in both. The ante-orbital notch is completely absent (as also in *Parahydromys*, but compare with the more primitive *Xeromys*). The greater part of each incisive foramen is contained in the premaxillary (in *Parahydromys* almost all of it is therein contained), and the ectopterygoid fossae are so shallow as to be virtually obsolete (true also in *Parahydromys* and *Xeromys*). The molar teeth, upper and lower, have substantially the characters of others of the family, m_3^3 being absent as in the majority of the Hydromyinae. The root system in *H. chrysogaster* was investigated by Jones (1922).

This was the first genus of the subfamily to be described and has much the widest range. *Hydromys* occurs in New Guinea and the Bismarck Archipelago, south through Australia, except the dry center, to Western Australia and Tasmania.

TYPE: *Hydromys chrysogaster* Geoffroy.

The following is a list of all named forms of *Hydromys*, with their type localities:

<i>chrysogaster</i>	Tasmania
<i>leucogaster</i>	Tasmania
<i>c. lutrilla</i>	Sydney, New South Wales
<i>c. fulvolavatus</i>	Murray River
<i>fuliginosus</i>	South Western Australia
<i>c. caurinus</i>	Parry's Creek, Wyndham
<i>melicertes</i>	Melville Island
<i>c. reginae</i>	Inkerman
<i>longmani</i>	Ravenshoe
<i>lawnensis</i>	Lawn Hill Creek
<i>grootensis</i>	Groote Eylandt
<i>moae</i>	Banks Island
<i>nauticus</i>	Aru Islands
<i>beccarii</i>	Kei Island
<i>esox</i>	Port Moresby
<i>oriens</i>	Mt. Lamington District
<i>illuteus</i>	Idenburg River
<i>neobritannicus</i> ^a	New Britain
<i>habbema</i> ^a	High mountains of central New Guinea

^a These last two are full species; the other races are synonyms of *H. chrysogaster*.

Though so many names have been applied to *Hydromys* in various parts of Australia and New Guinea, only three in my opinion can be retained as representing genuinely distinct species. These are *H. chrysogaster*, distributed over virtually the total range of the genus

below 5000 feet, *H. neobritannicus* of New Britain, and *H. habbema*, a small species found in the very high mountains of central New Guinea, which, to judge by the quality of its fur, may possibly be a little less truly aquatic. The two species *asper* and *moncktoni*, which Rümmler (1938) placed in *Hydromys*, are here returned to their respective genera, *Parahydromys* and *Crossomys*.

Rümmler (1938) and Ellerman (1941) concurred in the view that all the *Hydromys* of the lowlands of Australia and New Guinea were conspecific. They thought that in most instances the differences brought out in descriptions of type specimens could be explained as seasonal characters or age characters, or even as individual variations. Troughton (1948, p. 266) showed that a similar degree of variation induced Geoffroy to apply the two names *chrysogaster* and *leucogaster* to the Tasmanian water rat. On the other hand Troughton described as full species several forms from northeastern Queensland and near-by islands.

Rümmler, as remarked above, had reduced *Parahydromys* and *Crossomys* to additional full species of *Hydromys*. But Ellerman (1941), though he followed Rümmler's treatment of *H. chrysogaster*, reinstated *Parahydromys* and *Crossomys* as genera. *Hydromys chrysogaster* was divided by these authors into 14 races. *Baiyankamys* Hinton and our *Hydromys habbema* had not then been described. Still later, Ellerman (1949, p. 95) pointed out the external similarity of *H. habbema* to *Baiyankamys shawmayeri*. *Baiyankamys*, be it noted, retains the third lower molar, absent in *habbema* and all other true *Hydromys*.

Hydromys habbema Tate and Archbold

Hydromys habbema TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 3.

TYPE: A.M.N.H. No. 110055, adult male, from Lake Habbema, 15 kilometers north of Mt. Wilhelmina, 3225 meters, collected August 18, 1938, by W. B. Richardson.

MATERIAL: The original series from Lake Habbema, 25; and from the northeast slope of Mt. Wilhelmina at 3560 to 3600 meters, four.

The pelage of the type of this unusually small species is dense, soft, and colored Deep Mouse Gray, with the tips of the hairs silvery. The under parts are very little lighter. The terminal one-third to one-half of the tail is white.

The skull is only a little more than half as long as that of *H. c. beccarii*. The rostrum is rather slender, the nasals are little shortened, and the braincase is very full. The incisive foramina are long in proportion to those of other *Hydromys*. The width of the pterygoid fossa is substantially less than the width between m^1 , whereas in *H. chrysogaster* it is very little less (60 to 70 per cent as against 90 to 100 per cent). The teeth are typical of the genus. The structure of the animal is in general far more delicate than that of *H. chrysogaster* or *H. neobritannicus*.

In view of the usually smaller size of the animals in other genera of the Hydromyinae, it seems possible that *habbema* should be treated as a surviving primitive, and the widespread *chrysogaster* of Australia and the New Guinea lowlands regarded as specialized in the direction of increased size and weight. The general external likeness of *H. habbema* to *Baiyankamys* supports this view.

Hydromys chrysogaster Geoffroy

Considerable but fluctuating degrees of variation occur through the immense geographical range of *H. chrysogaster*, as extended by Rümmler, Ellerman, and myself. Yet with 23 specimens from New Guinea and 37 from northern Queensland as well as scattered individuals from other parts of Australia before me, I have been able to discover very few elements in these water rats that show consistent differences. One of the most reliable of these rare differences seems to lie in the dimensions of the molar teeth. I have arbitrarily chosen the length of the body of m^1 for use in comparisons. This is generally supported by other dental and cranial measurements, discussed beyond. The total range of tooth length for m^1 (the body of the tooth, not the wearing and cutting surface) varies in New Guinea material from 5.3 to 6.3 mm. Specimens from the extreme tip of the Cape York Peninsula agree with the foregoing. Material from the en-

tirety of the Atherton uplands area, from Cairns almost to Townsville, including offshore islands, also has teeth of approximately those dimensions (from 5.7 to 6.1). Arnhemland material can be expected also to have small teeth, judging by *melicertes*; also that from north Western Australia (*caurinus*).¹ Again, this small-toothed form recurs down the east coast of Australia, at Clermont in central Queensland, and at Imbil in south Queensland, in New South Wales, and in Tasmania.

A second type of *Hydromys*, bearing considerably larger molars, occupies the central part of the Cape York Peninsula from Iron Range and the Batavia River south through the McIlwraith Range to Cooktown and Mt. Finnegan. In this race the length of the body of m^1 varies from 6.5 to 7.0 mm. In greatly worn specimens it may be shortened to 6.3 mm., as with age a degree of abrasion such as we see in the molars of kangaroos appears to occur between m^1 and m^2 . This distributional pattern is at least true in the eastern half of the Peninsula, and probably also in the west, since the eastern specimens are in full agreement with the large-toothed form from Burketown which Troughton named *lawnensis*. These large-toothed *Hydromys* also agree quite closely with *reginae* taken at Inkerman just south of Townsville, with two individuals trapped by me near Rockhampton, and with *fulvolavatus* from the lower Murray River in South Australia. Even the Western Australian *fuliginosus* has rather large first molars which, though slightly smaller, suggest its relationship to this group rather than to any of the small-toothed *Hydromys*. The geographical pattern seemingly indicated for this large-toothed group is, broadly speaking, an interior one, separated from the sea except at Townsville (an arid area), at Rockhampton, and at a large section of the middle of the Cape York Peninsula. Note that both at Townsville and at Rockhampton large rivers rising in the interior reach the sea.

The result of this division of *chrysogaster* into small-toothed and large-toothed groups brings about the following arrangement of the named forms (based upon type specimens):

¹ Dahl (1897) wrote of *Hydromys* of Arnhemland: "... this species abounds in nearly all the northern lagoons, rivers, and creeks ..."

	LENGTH OF M ¹		LENGTH OF M ¹
Small-toothed	5.3-6.3	Large-toothed	6.3-7.0
<i>beccarii</i>	5.8	<i>lawensis</i>	6.5
<i>nauticus</i>	5.9	<i>reginae</i>	6.5
<i>esox</i>	5.9	<i>fulvolavatus</i>	6.5
<i>illuteus</i>	5.9	<i>fuliginosus</i>	6.3
<i>oriens</i>	?		
<i>moae</i>	?		
<i>melicertes</i>	6.0		
<i>caurinus</i>	?		
<i>longimani</i>	5.9		
<i>lutrilla</i>	?		
<i>chrysogaster</i>	?		

I do not think that the two groups exhibit characters of full specific rank. Instead, it seems that there may be regional groups in each column that are incompletely isolated from one another.

So far, this study of *Hydromys chrysogaster* has been based upon the size of m¹ (length of the body of the tooth). This measurement, I believe, fairly expresses the relative dimensions of the molar series, m¹ plus m², characters relatively unaffected by the growth of the animals. There remain for consideration numerous factors relating to age, sex, season, individual physiology, and even pathology. Among them is color.

The vast majority of the *Hydromys chrysogaster* (various forms and micro-races) examined, whether from Australia or New Guinea, have rather clear grayish white under parts, with the bases of the hairs light gray. In occasional specimens there is a slight wash of light golden yellow. This occurs without relation to locality, as in the series from around Coen and Rocky Scrub, halfway down the Cape York Peninsula. Or it may seem to have a geographical significance, as in the series from the Atherton Tableland, most specimens of which are tinted with yellowish. In a single male of that race there is a clear white patch on the chest. The yellowish coloring may be seasonal. Again, it seems to appear chiefly in males. Finlayson (1935) suggests that seasons may control the color. In winter his West Victorian *Hydromys* were "cold, dark grizzled gray dorsally and grayish white ventrally . . ." In a young specimen from Tasmania (C.N.H.M. No. 20194), month of capture unknown, the color is deepened to a rusty orange (true *chryso-*

gaster). In *fuliginosus* from Western Australia (series in M.C.Z.) the under parts are so considerably darker than in eastern forms that the ventral color no longer appears grayish white but instead gray or light gray. There seems to be no yellow on the under parts in either sex in this race. A single specimen referred to *illuteus* (C.N.H.M. No. 31847) from Waigeu Island, northwest of New Guinea, is almost as gray beneath as is *fuliginosus*.

The dorsal coloring is remarkably constant over the entire range of the species. Males tend to be a little more brownish, females more grayish. This brownish coloring tends to be correlated with the development of the brownish yellow or golden yellow wash on the under parts.

Other variations in pelage such as dullness and loss of gloss can be correlated with the molt and with progressive wear of the pelage. Ordinarily the aquatic type of pelage of *Hydromys chrysogaster* has a remarkable luster or sheen, but specimens occur in which large areas of the surface have lost the lustrous hairs and show instead only the dull soft gray of the dorsal under fur. Such a specimen is A.M.N.H. No. 154355 from Portland Roads on the east coast of Cape York Peninsula, some 200 miles north of Cooktown. In this animal, a male, the glossy hairs are missing from the entire area between the back of the head and middle of the back, extending onto the sides and upper fore limbs. Less extensive molting in the area of the shoulders is to be seen in a young specimen from Wenlock on the Batavia River. The first was collected May 31 and the second July 27. The male and female taken by me near Rockhampton in February both exhibit traces of molt in the neck region.

The extent of the white area of the tail tip in *Hydromys chrysogaster* is generally fairly constant. Variation seems to occur individually and at random. In general, more of the tail is white in Papuan material from north of the main ranges (the Idenburg-Hollandia area) than from southern New Guinea and Queensland, though this is not invariable. I have one specimen from between Cooktown and Coen, Cape York Peninsula, in which the tail is wholly black. The variations in pelage just discussed cut across the

large-toothed and shallow-toothed forms indiscriminately.

When allowance has been made for age and sex I believe there can be found few constant differences between the large-toothed *lawnensis* and the small-toothed *longmani* other than the average greater size of the former. The proximal ends of the nasals are relatively wider, the nasal processes of the premaxillaries relatively narrower, and the lacrimals more substantial in *lawnensis* than in *longmani*. Both the south Papuan and north Papuan *Hydromys*, though smaller in size, agree in these features with *lawnensis* rather than with *longmani*. A single fully adult male from the tip of the Cape York Peninsula (A.M.N.H. No. 154354) has the rostral and lacrimal characters of the south Papuan animals and, though its m^{1-2} are somewhat intermediate in size, I place it with the small-toothed forms. Our single young-adult male from the Port Moresby area (A.M.N.H. No. 108470) agrees substantially with other north or south New Guinea material, though the back of the mesopterygoid fossa, between the hamuli, is wider. An animal from Waigeu Island (C.N.H.M. No. 31847) is in virtually exact agreement with *longmani* of the Atherton area. By way of contrast, *H. neobrittanicus* with its almost sooty under parts, belted tail, enlarged forebrain region, and large foramen ovale is sharply different from the Papuan species.

Material from south of the Atherton Tableland consists of two specimens from near Rockhampton, which definitely belong in the large-toothed group (*lawnensis-reginae*), one from Tasmania (true *chrysogaster*), and six from Western Australia (*fuliginosus*).

The single example of *chrysogaster chrysogaster* is a young adult with the lacrimals lost. It differs quite sharply from both *longmani* and *lawnensis*. The nasals contract sharply behind expanded apices to become parallel-sided and at their posterior ends are cut squarely across by the fronto-nasal sutures. Their posterior portions are subequal to, or slightly broader than, the posterior portions of the nasal processes of the premaxillae. The rostrum, taken as a whole, is broader at the base, shorter, and more tapered than in the northern races. The nasal tips in relation to the anterior tips of the premaxillae are con-

siderably less shortened. The sutures between frontals and parietals form a distinct V instead of a rather open U in northern forms. The interparietal is exceptionally narrow, little more than half of the width of the interparietal of a skull of *longmani* of equal size. The inferior opening of the foramen ovale is very narrowly oval and partly obscured by the bridge of bone extending from the ectopterygoid wing. The lingual face of the second loph of m^1 , elongate in *longmani* (2 mm.), is short (1.5 mm.). The animal is "small-toothed." Study of this animal has led me to the view that the northern forms of *chrysogaster* are distinct racially from the typical Tasmanian race.

The Western Australian *fuliginosus* (six specimens) is distinguished by its extremely small lacrimals and by its posteriorly tapering nasals, which after exceeding the premaxillary processes posteriorly are somewhat squared at the back as in *chrysogaster chrysogaster*. In most other respects it agrees with the Queensland forms rather than with the Tasmanian skull I have just mentioned. Its m^1 is remarkably constant in size throughout the series (6.2 to 6.3 mm.). The shape of the inner wall of the second loph of m^1 agrees with that of *longmani* and *lawnensis* rather than of *chrysogaster*.

SOME MEASUREMENTS OF *Hydromys chrysogaster*

The water rats seem to resemble many marsupials in continuing to increase in size and weight through much of their lives. The mature stage of the water-resisting pelage is reached early, so that quite small-sized specimens give the appearance of adulthood. The teeth also come into place early and thus support this impression. It is therefore possible to find a wide range of sizes in specimens from any given environment, and divergences of size based upon single specimens are apt to be misleading. Even when these facts are borne in mind, certain size differences by quite extensive regions do nevertheless appear. Thus, the New Guinea forms of *H. chrysogaster* and those of coastal New South Wales and coastal southern Queensland rarely or never attain quite the same size as the large-toothed water rats of the middle and southwest of Cape York Peninsula, inland Queensland, and in-

land New South Wales. In judging such distinctions, only fully adult specimens with fully developed parts, other than the non-growing teeth, can provide significant results, and one must be reasonably sure that he has maxima to deal with in every case. The sexes in *H. chrysogaster* are normally of equal size. The measurements used beyond are selected from many, as likely to have greatest systematic value.

CONDYLOBASAL LENGTH

In specimens from Papua this length varies in full adults from 48.5 to 50.0 mm. We have a single male from Hollandia in which it reaches 53.0. The one adult from Somerset, tip of Cape York, gives 56.8. The types of *moae* and *caurinus* show 52.8 and 59.0. In the large-toothed *Hydromys* of the Cape York Peninsula the condylobasal length varies from 55.0 to 62.5; the type of *reginae*, 61.5; and my specimen from Rockhampton, 63.0. The type of *fulvolavatus* is young; *fuliginosus* gives 53 to 54, Tasmanian *chrysogaster* (one specimen), 59.5; and small-toothed *longmani*, ± 55.0 mm.

NASAL AND PALATAL LENGTHS

The nasal length in northern material varies from 28 to 33 per cent of the condylobasal length. In large-toothed species it is slightly greater, about 34 per cent. But in our one true *chrysogaster* it is only 30 per cent. The palatal length in New Guinea specimens varies from 53 to 57 per cent and remains virtually the same in large-toothed *Hydromys*. In true *chrysogaster* it is 57 per cent.

The molar tooth rows (m^{1-2}) measure usually 7.5 to 8.1 mm. in Papuan *Hydromys*, but the individual from Hollandia gives 8.8 mm. In Australian large-toothed forms they measure from 8.7 to 9.2 mm. The Atherton Tableland race *longmani* has small teeth as do the Papuan forms, ± 8.0 mm., while *H. fuliginosus* of Western Australia stays uniformly close to 8.8 mm. The specimen of *chrysogaster* has the tooth row 8.3 mm.

The length of the incisive foramina in south Papuan and Aru Island animals varies from 5.0 to 5.5 mm. The types of *moae*, *longmani*, and *melicertes* conform with this, but the type of *grootensis* attains 7.0 mm. and of *caurinus* 6.3 mm. Our single specimen from Somerset

gives 7.4 mm. The incisive foramina of the northern large-toothed *Hydromys* measured from 6.0 to 6.3, but only 5.7 in our Rockhampton specimens, while in *fuliginosus* they are still shorter, ± 5.0 mm. They are likewise very short in *chrysogaster*, 4.9 mm.

It appears from this quick survey that the detailed relationships of *Hydromys* can be worked out only by refined statistical methods, using a great deal more material, with more uniform geographical distribution, than is available to me. Then perhaps more racial distinctions will be detected. My present conclusions, illustrated by the accompanying distribution map (fig. 1), are based chiefly on the size of the molars but also on the facts pointed out above. They may omit or synonymize certain local colonies, the existence of which seem not to be conclusively demonstrated.

I would write the synonymy of the races of *Hydromys chrysogaster* provisionally as follows:

1. *chrysogaster* (= ?*lutrilla*)
2. *fuliginosus*
3. *fulvolavatus*
4. *reginae* (probably = *lawnensis*, and the northern representative of *fulvolavatus*)
5. *beccarii* (1875), representing the whole small-toothed complex of forms from south Papua, tip of Cape York, and Atherton-Cairns, including *aruensis*, *nauticus*, *esox*, *moae*, *grootensis*, *melicertes*, *caurinus*, and also *longmani*
6. *illuteus*, with *oriens* (very doubtfully separate)

Everything today points to a former wider and more complete distribution of *Hydromys* over Australia. The more humid climate which existed at times during Pleistocene time would have permitted water to run in many of the river valleys that now remain dry for years on end. The conjunction of the ranges of *fuliginosus* and *fulvolavatus* across the Nullarbor area and of *caurinus* with the Arnhemland water rats would have been made easy. In amply watered New Guinea *Hydromys* follows all river courses to their tiniest beginnings and occupies all swamps. It ascends to several thousand feet above sea level.

In arid western Queensland there are, possibly were, moist pockets in which *Hydromys* occurs. I was informed that water rats are still found in the Warrego River, a north tribu-

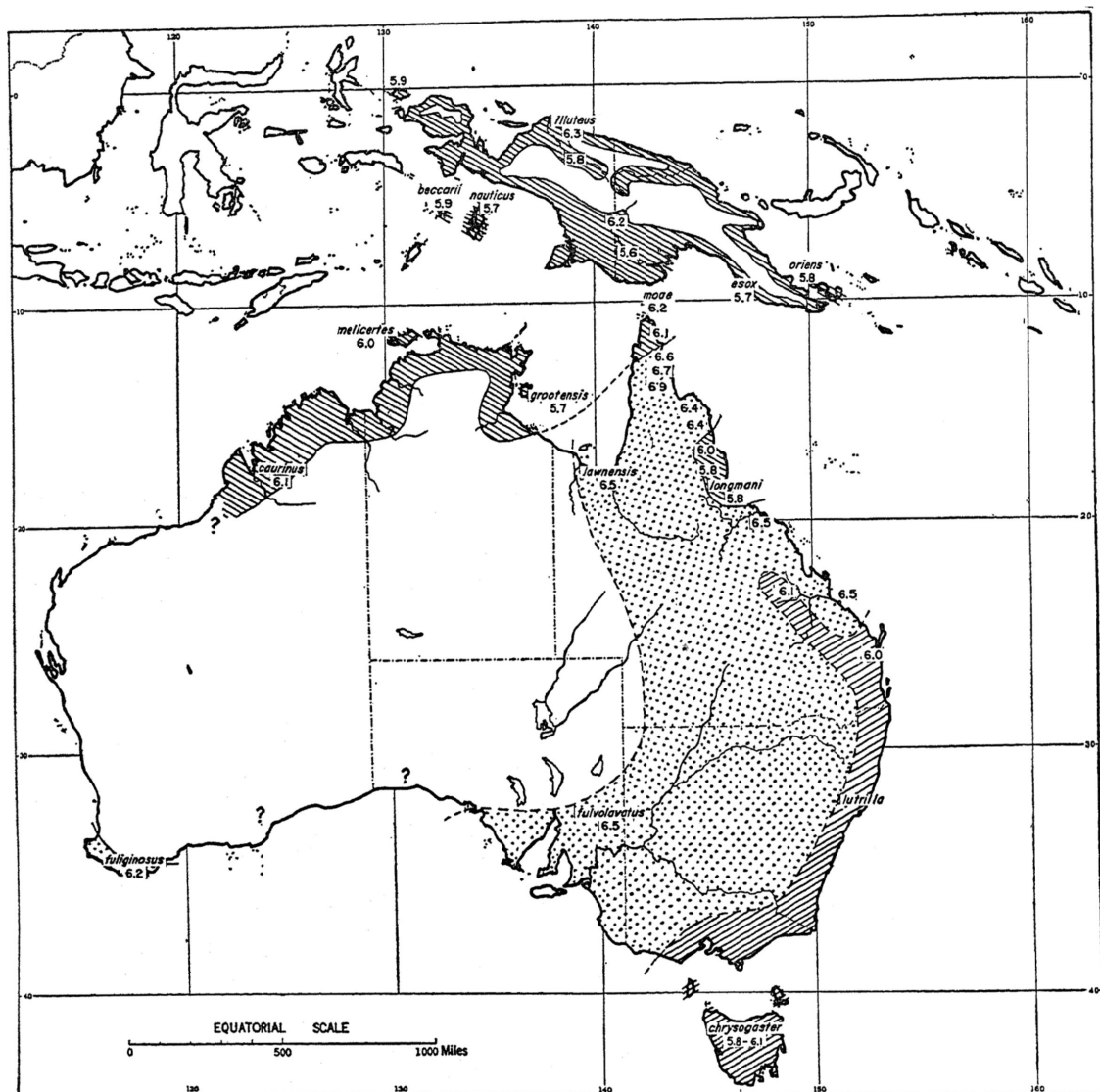


FIG. 1. Present distribution of *Hydromys chrysogaster*, showing named forms with their type localities and, by means of shading, the present grouping into large-toothed and small-toothed subspecies. The numbers indicate the average length of m^1 . In the pluvial periods of the Pleistocene *fuliginosus* may have been connected along the south coast with *fulvolavatus*. *Hydromys* is, of course, fairly closely confined to the river systems.

tary of the lower Darling, which drains the Charleville area and northward. Again, while staying at Winton (in the 20-inch rain belt) on the Central Line I was told of water rats in a creek about 30 miles to the west. This would take them as far west as longitude 143° E. The creek would presumably flow to the Diamantina River. Finlayson (1939a, p. 114) recorded them from the Barcoo and Diamantina rivers.

Hydromys chrysogaster chrysogaster Geoffroy

Hydromys chrysogaster GEOFFROY, 1804, Bull. Soc. Philom., Paris, vol. 93, p. 254.

Hydromys leucogaster GEOFFROY, 1804, Bull. Soc. Philom., Paris, vol. 93, p. 254.

?*Hydromys lutrilla* GOULD, 1863, The mammals of Australia, introduction to vol. 1, p. xxxvi.

TYPES: Of *chrysogaster*, Paris, No. 781, sex not indicated, from Straits of D'Entrecasteaux, collected by Levillan, "naturaliste

de l'expédition" of Peron and Lesueur. Ellerman gives Bruni Island. The type is a mounted skin furnished with imitation teeth; its skull was not found in 1937. Of *leucogaster*, not found. Rode (1945) catalogued it as present in the collection. The type of *lutrilla* is a young specimen, with skull inside skin, in the Australian Museum, Sydney.

MATERIAL: Northwest Tasmania (C.N. H.M. No. 20194), young, probably a male; Tasmania (M.C.Z. No. 6005), complete skeleton.

Present color of the type of *chrysogaster* yellowish brown (faded), under parts buff, with the hair bases gray. Tail light fuscous. The width of the hind foot at the base of the fifth metatarsal, 13 mm.; the width of the ear, 13 mm. Length of head and body, ± 280 mm.; hind foot (s.u.), 64, (c.u.), 67; length of ear, 11.

In this species it appears that the deep orange under parts tend to be usual in males, whitish under parts in females, hence Geoffroy's names *chrysogaster* and *leucogaster*. The pelage in the Chicago Natural History Museum specimen is exceptionally dense and glossy, and there is a mass of close, soft under fur.

The skulls of both that specimen and the skeleton at the Museum of Comparative Zoölogy are characterized by the fact that the nasals terminate posteriorly in a nearly square-cut line with the frontals. This is especially noticeable in the young specimen. The labial face of the second loph of m^1 is short in both animals. The incisive foramina are even shorter than in northern races of *chrysogaster*, quite sharply pointed in front and broadly rounded at the back. Further study of ample Tasmanian material will reveal whether these seeming differences are valid or not.

If the Tasmanian races are also present in eastern Victoria and eastern New South Wales, and this type of distribution is quite common, then *lutrilla* Gould, from Sydney (*vide* Ellerman), is likely to be synonymous.

In addition to the Tasmanian specimens now in America, I have records of specimens of "*Hydromys chrysogaster*" in the Sydney Museum from numerous places in New South Wales and in the Queensland Museum from a number of places in southern Queensland, though I have little to show to which race

each belongs. The length of the first molar has been measured for me by Mr. George Mack, Director of the Queensland Museum, who cooperated so generously with the Cape York Expedition, for four of the Queensland specimens, the others being unmeasurable for various reasons. They seem all to be small-toothed (Q.M. No. 3184, male, Clermont, 6.1 mm.; Q.M. No. 3627, male, Dunk Island, 5.8; Q.M. No. 5275, female, Palm Island, 5.8; Q.M. No. 7409, female, Imbil, 6.0). In the case of the New South Wales *chrysogaster* considerable study will be needed to show where the small-toothed *lutrilla* of the coast is replaced by the large-toothed *fulvolavatus* of western New South Wales. The Sydney collection contains specimens from at least six suburban localities, Campbelltown, Camden, Paramatta, Liverpool, Randwick, and Hen and Chicken Bay, all of which are presumed referable to *lutrilla*. Single specimens from Lake Macquarie, 60 miles north-northeast of Sydney, also Lawson, 30 miles west of Sydney, and Bombala, some 200 miles south of Sydney, both in the eastern run-off, may also belong to *lutrilla*.

From over the principal divide there are specimens in the Australian Museum from four localities just west of the crest, namely: Tarana, Bathurst, the Jenolan Caves area, and the Lachlan River. Studies should be made to determine whether these are large toothed or small toothed. From farther west of the divide there are specimens from Mudgee, Tumut, Narrandera, Condolobin, Eubalong, and Bourke. The last four in particular are presumed to be referable to the large-toothed *fulvolavatus*.

Hydromys chrysogaster fulvolavatus Gould

Hydromys fulvolavatus GOULD, 1853, The mammals of Australia, pt. 5 (vol. 3), pl. 25 and text.

TYPE: B.M. No. 56.10.28.14, young adult, from Murray River, South Australia [i.e., west of longitude 141° E.].

MATERIAL: None. It is assumed on the basis of distribution that the specimens in the Australian Museum, Sydney, from Condolobin, Eubalong, Narrandera, Tumut, and Bourke are referable to this large-toothed water rat.

I noted no particular features concerning the skin. The type skull is rather young,

but its teeth are worn. The length of m^1 plus m^2 is 9.1 mm.

***Hydromys chrysogaster fuliginosus* Gould**

Hydromys fuliginosus GOULD, 1853, The mammals of Australia, pt. 5 (vol. 3), pl. 27 and text.

TYPE: There is apparently a type series from which Thomas has designated B.M. No. 56.10.28.15, adult female, "lectoparatype." Collected at King George's Sound, Western Australia. The back of the skull is broken.

MATERIAL: Margaret River (M.C.Z.), five; Pemberton (M.C.Z.), one; both at approximately latitude 35° S.

The type skull of *fuliginosus* presents few distinctive characters. The race is noteworthy for the very small size of the lacrimals, and this can be seen on those specimens in the Museum of Comparative Zoölogy that still retain them.

The skins of the recently caught material are noticeably dark gray, practically without brown or yellow tints, and the under parts a rather dark gray-white. The tooth series is remarkably uniform in size and shape throughout.

In the more pluvial times at the end of the Pleistocene, this race may be expected to have made contact across the Nullarbor country with *fulvolavatus* of South Australia and western New South Wales.

***Hydromys chrysogaster reginae* Thomas and Dollman**

Hydromys chrysogaster reginae THOMAS AND DOLLMAN, 1909, Proc. Zool. Soc. London, for 1908, p. 789.

Hydromys lawnensis TROUGHTON, 1935, Rec. Australian Mus., vol. 19, p. 253.

TYPES: Of *reginae*, B.M. No. 8.8.8.23, adult male, from near Inkerman, 50 miles southeast of Townsville, northern Queensland, collected by Stalker. Of *lawnensis*, Sydney, No. M.5650, adult male, from Burketown, at the base of the Gulf of Carpentaria, northern Queensland, collected by Troughton and Fletcher.

MATERIAL: Mt. Finnegan, 30 miles south of Cooktown, one; Cooktown, 10 miles west, one; Musgrave Telegraph Station, 100 miles west-northwest of Cooktown, one; Coen (A.M.N.H.), four; (M.C.Z.), one; Rocky

Scrub and Peach River, respectively east and west of the McIlwraith Range (A.M.N.H.), four; (M.C.Z.), two; Archer River at the telegraph crossing, two; Wenlock, Batavia River, four; Brown's Creek, Pascoe River, two; Iron Range, Claudie River, two; Portland Roads, latitude 12° S., one. In addition to the foregoing, all of which are on Cape York Peninsula, "The Serp," tributary of the Fitzroy River, 20 miles north of Rockhampton, two.

The type of *reginae* was compared by Thomas with *chrysogaster*. It was said to be grayer, thus possibly in a molting condition. The under surface was white, tinged with buff.

The length of the tooth row is 8.9 mm., the width of m^1 , 3.2, the length of the body of m^1 , 6.5.

The type of *lawnensis* was described by Troughton as having the tail longer than the head and body and its "upper molar series the longest known for the genus." It was compared with *longmani*, the smaller race of the Atherton-Cairns area. Troughton gives the length for the molars as 9.3 mm., the breadth of m^1 , 3.1. When I remeasured the type in Sydney I obtained 9.2 and 3.3 mm. for these dimensions. The length of the body of m^1 was 6.5 mm.

The entire series listed above agrees closely with the two types in possessing exceptionally large molar teeth and heavy skulls. The length of the body of m^1 is approximately 6.3 to 7.0 mm., in contrast to 5.3 to 6.3 mm. in the smaller *longmani* of the Atherton-Cairns area and *beccarii* of the extreme tip of the Cape York Peninsula (Somerset, Red Island Point, Newcastle Bay) and New Guinea. As pointed out already, the affinities of this race appear to be with *fulvolavatus* of southern South Australia and western New South Wales. Subject to changing environmental conditions (drying of watercourses) the two races may well be confluent.

***Hydromys chrysogaster beccarii* Peters**

Hydromys beccarii PETERS, 1875, Ann. Mus. Civ. Genova, vol. 6, p. 303.

Hydromys esox THOMAS, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 324.

Hydromys caurinus THOMAS, 1909, Ann. Mag. Nat. Hist., ser. 8, vol. 4, p. 197.

Hydromys nauticus THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 429.

Hydromys melicertes THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 430.

Hydromys longmani THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 171.

Hydromys grootensis TROUGHTON, 1935, Rec. Australian Mus., vol. 19, p. 252.

Hydromys moae TROUGHTON, 1935, Rec. Australian Mus., vol. 19, p. 254.

TYPES: Of *beccarii*, Genoa, No. C.E.3627, adult male in alcohol, skull cleaned, from Werri, Kei Islands, collected by Beccari. Of *esox*, B.M. No. 6.1.26.1, young male from Port Moresby, purchased from Gerrard. Of *caurinus*, original no. 34, from Parry's Creek, near Wyndham, east Kimberley, north Western Australia, collected October 29, 1908, by J. P. Rogers. Of *nauticus*, B.M. No. 10.3.2.14, old female, from Dobo, Aru Islands, collected April 8, 1909, by Stalker, "caught on the fore shore at night." Of *melicertes*, B.M. No. 13.6.28.37, young female, from Biro, Apsley Strait, Melville Island, Northern Territory, sea level, by J. P. Rogers. December 9, 1911, back of skull broken, "trapped near mangroves." Of *longmani*, B.M. No. 22.12.18.2, adult male, from Ravenshoe, Atherton Tableland, north Queensland, skin of type not seen. Of *grootensis*, Sydney, No. M.4558, sex uncertain, an unfilled skin with skull, from Banks (=Moa) Island, Torres Strait, presented by Le Soeuf.

MATERIAL: Berlin, No. 4805, from Great Kei (representing *beccarii*), one; Evelyn, two; Millaa Millaa (M.C.Z.), one; Wongabel (C.N.H.M.), two; Lake Barrine, three; (M.C.Z.), one (all four of these are places on Atherton Tableland); Russell River, 50 feet, two; Hinchinbrook Island, two (all representing *longmani*); Astrolabe Range (representing *esox*), one; Black River, upper Fly River, one; Lake Daviumbu, middle Fly River, six; Sturt Island Camp, lower Fly River, three; Gaima, lower Fly River, one; Wassi Kussa, southwest of Western Papua, one; Newcastle Bay, near Somerset, tip of Cape York Peninsula, two (all to be regarded as true *beccarii*). Total, 29.

The type of *beccarii* is an adult male, fuscous above, touched with tawny; beneath yellowish white, with gray bases. More

than half of the tail is white. The cleaned skull is small and conforms quite closely to that of *grootensis*, though its incisive foramina are somewhat shorter. It comes very close indeed to *esox*, and I have little doubt that the two are synonymous.

The type of *nauticus* has the upper parts fuscous, touched with pale silvery or whitish, the under parts dirty white, the terminal 80 mm. of the tail white. It is an old female. The skull has small teeth; the anterior faces of the incisors are unusually pale yellow.

I did not see the type of *caurinus*, but the skull and tooth dimensions given by Thomas suggest that it is one of the small-toothed *Hydromys*.

The type of *melicertes* is very similar to that of *beccarii*, *caurinus*, and *nauticus*. I found no special characters in the skull. The teeth are small.

The type of *longmani*, an adult male, has the under parts slightly yellowish than in most, but not all, of the Papuan examples. Its small size is not out of keeping with *beccarii*. The animal is much smaller than the race *reginae*, with which Thomas compared it.

The type of *grootensis*, skinned from alcohol, appears somewhat discolored; Troughton wrote of its "amber tone." The palate is rather long; the incisive foramina are unusually long. The molars m^{1-1} are rather widely spaced, the individual teeth small and narrow.

The type of *moae* is somewhat grayish above, possibly in relation to the molt; the under parts are buff. The skull offers no peculiarities other than the short incisive foramina.

The type of *esox* (Astrolabe-Moresby area), a young male, is somewhat more brownish than *beccarii* and *nauticus*. The under parts are white, with a faint brownish yellow wash. The terminal 90 mm. of the tail is white. The skull is without special characters; its back is broken.

The assemblage of the foregoing names of small-toothed forms together in the single subspecies *beccarii* not only serves to emphasize their great resemblance to one another but also to contrast them, taken together, with the large-toothed *reginae-lawnensis* race of the middle of the Cape York Peninsula and

the interior of northern and central Queensland. The component parts of the now widespread *H. c. beccarii* should be regarded as populations, some of which may have developed genetic characteristics which are still too varying and too slight to warrant recognition in nomenclature. That such populations, differing by the most minute and often very inconstant characters, can exist in a subspecies is well understood. It is with doubt that I leave the north New Guinea race *illuteus* not synonymized.

***Hydromys chrysogaster illuteus* Thomas**

Hydromys esox illuteus THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 264.

Hydromys oriens TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 127.

TYPE: Of *illuteus*, B.M. No. 22.2.2.61, young male, from Prauwen Bivak, Idenburg River, collected September 18, 1920, by W. C. Van Heurn. Of *oriens*, Sydney, No. M.4683, adult male, from the Mt. Lamington district on the southern border of the Northern Division, Papua, collected in 1929 by C. T. McNamara.

MATERIAL: Bernhard Camp, Idenburg River, 800 meters, seven; Hollandia, one.

The type of *illuteus* was compared by Thomas with *esox* of the Port Moresby area. The pelage in our series as well as in the type appears darker, somewhat less glossy, possibly owing to wear, and almost without brown shades. The under parts have a slight buffy wash over the grayish white. In the type, the terminal 90 mm. of the tail is white.

The skull provides no constant characters of even subspecific value. The length of the body of the first molar is 5.9 mm. in the type. It runs from 5.7 to 6.0 mm. in the Idenburg series, but attains 6.3 mm. in the specimen from Hollandia. This last equals the minimum for the big Queensland race *reginae*.

The synonymizing of *oriens* is provisional. Troughton gave the length of the tooth row as 8.7 mm. and the width of m^1 as 3.1, measurements that fit both the northern and the southern races in New Guinea. He stated that the tips of the ventral fur were "unevenly washed with bright ochraceous-tawny." This color in my experience is chiefly an indication that the animal is a male, yet by no means all males are so colored. The

increased proportion of white on the tail is a variable feature.

***Hydromys neobritannicus* Tate and Archbold**

Hydromys neobritannicus TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 8.

TYPE: A.M.N.H. No. 99867, adult female, from Bainings, Balayang, Wide Bay, New Britain, collected March 4, 1933, by W. F. Coultas, Whitney South Sea Expedition.

This species, still known by the type only, is set off from all other *Hydromys* by its blackish brown under parts, and its tail belted with white in the middle and tipped with about 1 inch of white. The skull and teeth are generally heavier than in the small-toothed races of *H. chrysogaster* but not heavier than those of the large-toothed *H. c. lawnensis* and *reginae*.

I believe this New Britain animal should be retained as a full species, at least until evidence to the contrary comes to light, though its relationships are without much question with *chrysogaster*, not with *habbema*.

PARAHYDROMYS POCHÉ

Limnomys THOMAS, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 325.

Parahydromys POCHÉ, 1906, Zool. Anz., vol. 30, p. 326.

Drosomys THOMAS, 1906, Proc. Biol. Soc. Washington, vol. 19, p. 199.

A *Hydromys*-like genus in which the terrestrial habitus is preserved, or possibly regained. The pelage is firm to bristly, not dense and sleek as in the aquatic *Hydromys*. The lips are much more tumid than in *Hydromys*. The skull, which has the basic characters of *Hydromys*, is relatively much broader and more massive. The base of the rostrum at the level of the roots of the incisors is especially broad. Rümmler (1938) reduced this genus to a species of *Hydromys*.

The vertical range is quite restricted: *Parahydromys* appears to be limited to the mountain slopes of New Guinea between 2000 and 9000 feet.

TYPE: Of all three generic names, *Hydromys asper* Thomas.

In view of the modification of the soles of the feet in a manner similar to those of the aquatic *Hydromys*, it seems that *Parahydromys* may be only secondarily terrestrial

(Stein, 1933, p. 123). Its harsh pelage is not like that of an aquatic animal.

***Parahydromys asper* (Thomas)**

Hydromys asper THOMAS, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 326.

TYPE: B.M. No. 99.4.4.1, adult male, from Mt. Gayata, Richardson Range, part of Owen Stanley Range, 2000 to 4000 feet, British New Guinea, received from Gerrard, professional collector.

MATERIAL: Kagi, Moresby-Kokoda track, 5000 feet, two (virtual topotypes); south of Bernhard Camp, Idenburg River, 1200 meters, one; same, 1500 meters, one; Bele River, 18 kilometers north of lake Habbema, 2200 meters, 11; 9 kilometers northeast of Lake Habbema, 2700 to 2800 meters, three; Weyland Mountains, 6000 feet, four. Total, 22.

Pelage of type brownish gray, the hairs rather short and stiff. Under parts dull white with a buffy wash. The terminal 110 mm. of the tail is white, a brush of hairs adding 25 mm. to its length. Ears well developed but small.

The wide, short skull has the braincase very full, the base of the rostrum much broadened, the bullae rather large. The incisive foramina, which are quite short, are almost wholly included in the premaxillae. The teeth are large. The incisors grow with their roots wide apart and their tips converging.

CROSSOMYS THOMAS

Crossomys THOMAS, 1907, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 70.

Even more specialized for life in streams than *Hydromys*. The fine waterproof fur, greatly reduced ears, inferiorly crested tail, and the more completely webbed hind foot all so indicate. The swimming hairs of the tail remind one of the condition to be seen in the Asiatic water shrew, *Nectogale*.

The range of *Crossomys* will ultimately be shown as limited to the fast-flowing streams of the Central Range of New Guinea between 2000 and 6000 feet. This genus, like *Parahydromys*, was reduced to the synonymy of *Hydromys* by Rümmler, the species being maintained as distinct.

TYPE: *Crossomys moncktoni* Thomas.

***Crossomys moncktoni* Thomas**

Crossomys moncktoni THOMAS, 1907, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 72.

TYPE: B.M. No. 7.5.22.3, young adult female, from Serigina, Brown River, Central Division, Papua, 4500 feet, collected October 12, 1916, by C. A. V. Monckton. "Caught while swimming down a rapid creek."

Dorsal pelage long and soft, mottled brownish gray. Under parts pure white to the base of the hairs, very soft and cottony. Ear conch reduced to about 1 mm. Tail light gray above from base to tip, its under side white; with two rows of long white hairs which begin at either side of the base and converge to a single row about 50 mm. from the base. Thereafter the single row continues along the center of the under surface to the tip. Hands very small and wrists slender, their width, compared with that of *Hydromys*, 3 to 5.5 mm. Feet with the claws much shortened.

Skull with very full braincase, short nasals, and short palate and tooth row. The palate strongly arched. Bullae very small. Rostrum narrowed, particularly in front.

Still known only from the type specimen.¹

SUBFAMILY MURINAE

The Murinae are commonly distinguished from the similar-appearing Cricetinae by the arrangement of the tubercles of the upper molars. The cusps in the Murinae are arranged in "three primary longitudinal rows"; those of the Cricetinae, in "two primary longitudinal rows" (Miller, 1912). Simpson (1945, p. 205) thought that the Murinae were derived from primitive cricetines "most likely toward the end of the Miocene," though he did not go into the particulars of how the dental alterations were achieved.

Among the Papuan and Australian Murinae there are several genera in which the labial and mesial rows of tubercles are more or less united. It is uncertain whether this condition represents an early stage in a process of the parting of two rows of cusps into

¹ A second specimen, in preservative, was collected July 21, 1950, near Tomba, 40 miles from Mt. Hagen airstrip on the track to Wabag, by Mr. E. T. Gilliard during his recent expedition to the Mt. Hagen area of New Guinea. A note based on this animal has been published (1951, Amer. Mus. Novitates, no. 1523).

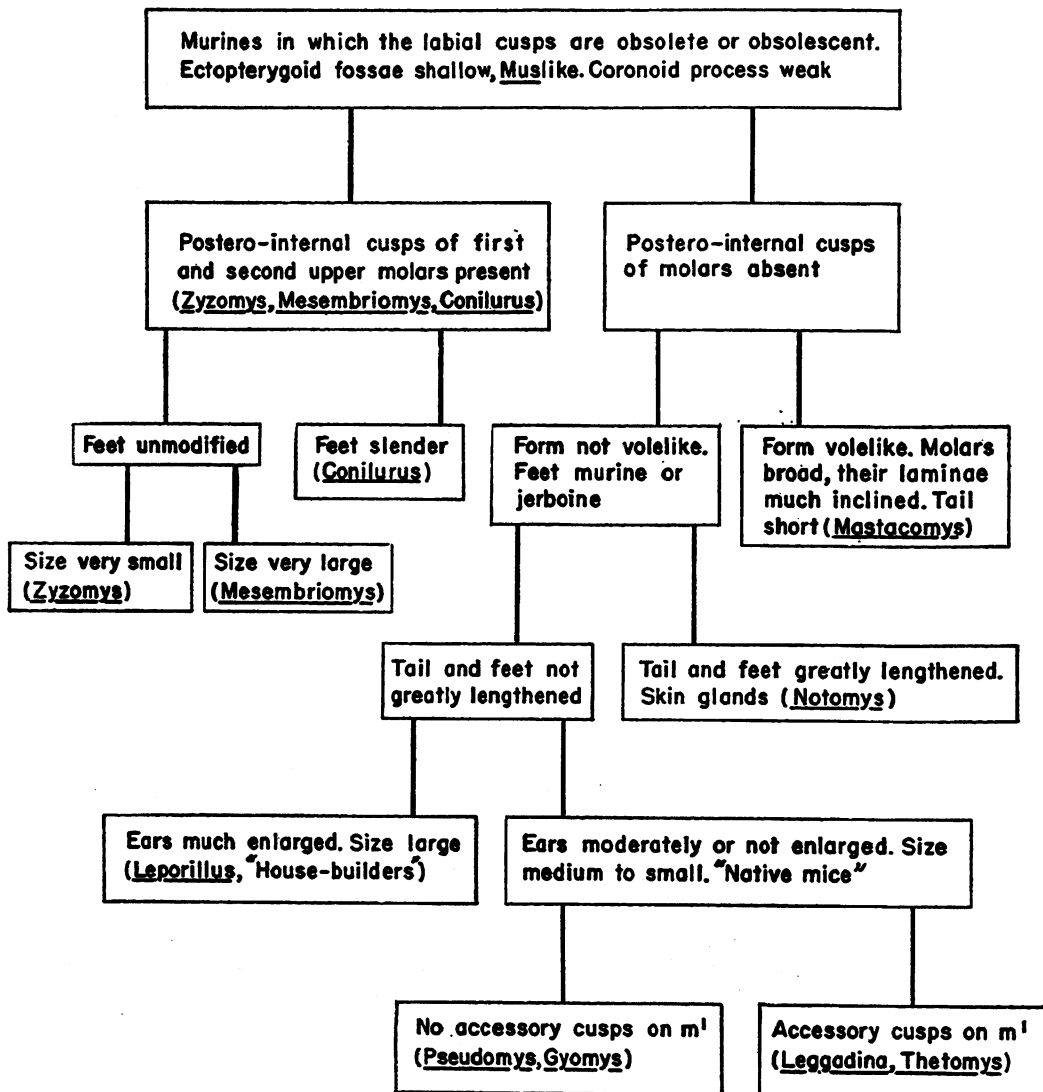


FIG. 2. Suggested phylogeny of the "Australian genera" of rodents.

three rows of cusps, or is a more recent reverse action bringing about the fusion of the labial and mesial cusps into one.

The "Australian genera" (*Pseudomys* and allies), as a whole, display this coalescence of cusps to a varying degree. The Papuan *Macruromys* and some others show the same phenomenon. The remaining Papuan genera, apart from *Melomys* and its allies and *Rattus*, are very distinct, isolated types displaying highly characteristic cranial and dental anatomy. Several are monotypic. Most of them have no close living relatives elsewhere in the world, though in the cases of *Mallomys*

a possible affinity with *Crateromys* of Luzon may exist.

The primary groups of the Australian Murinae (fig. 2) can be viewed synoptically as follows:

OLDER IMMIGRANTS

The "Australian genera," a single radiation, possibly with *Lorentzimys*

Mallomys, possibly related to *Crateromys*

Hyomys, relationship not determined

Macruromys, relationship not determined

Anisomys, relationship not determined

Pogonomys, relationship not determined

NEWER IMMIGRANTS

The *Uromys* radiation

The several divisions of *Rattus*

PSEUDOMYS GRAY

Thomas (1910) divided the original genus *Pseudomys* (*sensu lato*) into four "subgenera": *Pseudomys* (*sensu stricto*), *Thetomys*, *Leggadina*, and *Gyomys*. Troughton (1937), after discussing Thomas' classification of these rodents, gave it as his opinion that *Mus fieldi* Waite was a true *Pseudomys* allied to *minnie*. In the present paper *fieldi* is placed in *Thetomys*. Ellerman (1941) reached the

conclusion that *Gyomys* and *Leggadina* were not very closely related to *Pseudomys* and *Thetomys*. He placed *Gyomys* between *Rattus* and *Leporillus*, and *Leggadina* after *Mus* and *Mycteromys*. Later, in his supplement (1949, p. 86), he questioned whether *Thetomys* should be maintained even as a subgenus of *Pseudomys*.

I can concur only in part with Ellerman in this matter, as I would keep *Gyomys* as another subgenus. There appears to be little difference in the character of the dentition in *Pseudomys* and *Gyomys*, but *Thetomys* has the distinctive anterior cuspule on the first

TABLE 3
CRANIAL RATIOS IN THE SPECIES OF THE SUBGENERA OF *Pseudomys*

	Ratio of Length of Incisive Foramina to Length of Tooth Row		Ratio of Length of Bulla to Length of Tooth Row	
<i>Pseudomys</i>				
<i>australis</i>	7.9:5.8	130%	—	—
<i>murinus</i>	7.9:5.6	140	—	—
<i>minnie</i>	7.3:5.8	125	—	—
<i>flavescens</i>	7.5:5.7	130	5.3-5.6:5.7-5.8	±93%
<i>lineolatus</i>	8.7-8.8:6.4-6.6	135	—	—
<i>auritus</i>	8.8:6.3	140	—	—
<i>oralis</i>	7.3:6.6	110	5.8:6.6	82
<i>shortridgei</i>	6.5:5.9	110	5.6:5.9	95
<i>rawlinnae</i>	7.0:5.3	130	—	—
<i>higgins</i>	6.8:5.5	120	5.5:5.5	100
	6.8-8.8:5.3-6.6	110-140	5.3-5.8:5.5-6.6	82-100
<i>Gyomys</i>				
<i>novaeollandiae</i>	5.0:3.9	128	4.2:3.9	108
<i>pumilus</i>	4.0:3.5	115	3.6:3.5	102
<i>bernyei</i>	5.8:4.6	125	5.2:4.6	113
<i>apodemoides</i>	5.0-5.0:3.8-3.9	122-128	4.7-4.3:3.8-3.9	110-124
<i>desertor</i>	4.4-3.9:5.1-5.2	75-86	5.4:5.1	105
<i>fumeus</i>	6.0:5.5	110	—	—
<i>glauco</i>	5.6:4.2	135	4.4:4.2	105
<i>albocinereus</i>	5.1-4.9:4.0-4.1	120-125	—	—
<i>occidentalis</i>	5.1-5.6:4.5-4.6	115-120	5.1-5.2:4.5-4.6	113-114
	3.9-6.0:3.8-5.5	110-135	3.6-5.4:3.5-5.1	100-125
<i>Thetomys</i>				
<i>nanus</i>	6.5:5.6	116	5.6:5.6	100
<i>ferculinus</i>	5.5:5.3	104	5.1:5.3	97
<i>praeconis</i>	6.4:4.7	135	5.8:4.7	125
<i>gracilicaudatus</i>	6.7:6.1	110	—	—
<i>ultra</i>	7.3:5.8	125	5.0:5.8	86
	5.5-7.3:4.7-6.1	104-135	5.0-5.8:4.7-5.8	86-125

molar. In other respects *Gyomys* is considerably smaller and more mouse-like than *Pseudomys* (*sensu stricto*). It shows no development of a spine on the zygomatic plate. This spine is often present in *Thetomys*, and in trace form in *Gyomys*. All have the skull widely fenestrated in the region of the optic foramen and on either side of the central presphenoid-basisphenoid suture. The notch and ligulate process of the post-tympanic hook of the squamosal are well developed in *Pseudomys* (*higginsi*) but are merely incipient in *Gyomys* (*occidentalis*). It remains to be shown whether or not this particular divergence is constant throughout. My own view would be to continue *Gyomys* and *Thetomys* as subgenera of *Pseudomys*, while treating *Leggadina* as a full genus.

Leggadina (*delicatula*) is especially divergent from *Pseudomys* and allies from the fact that the laminae of its molars slope almost as markedly as those of *Mastacomys*, as well as from the relative narrowing and elongation of its first molars and their strongly developed anterior cuspule.

In table 3 I have compared all the species of which I have measurements in *Pseudomys*, *Gyomys*, and *Thetomys* in regard to the two ratios, length of incisive foramina to length of molars, and length of bulla to length of molars. In every species of each subgenus, with the one exception of *Gyomys desertor*, the length of the incisive foramina is greater than the length of the tooth row. In *Gyomys desertor* the tooth row is longer, the foramina being only 75 to 86 per cent of it. This may imply the existence of a very distinct division if other characters can be adduced. It is also to be noted that in *Pseudomys* no incisive foramina measure less than 6.8 mm., while in *Gyomys* no incisive foramina exceed 6.0; *Thetomys* holds an intermediate position. The sizes of the tooth rows are almost as completely separate: 5.3 to 6.6 in *Pseudomys*, and 3.8 to 5.5 in *Gyomys* (only *desertor* and *fumeus* have teeth exceeding 5.0 mm.). In this respect, too, *Thetomys* is intermediate. Regarding length of bulla, *Pseudomys* has small bullae less than 100 per cent of the tooth row, while *Gyomys* has large bullae 100 to 125 per cent of the tooth row. Once again *Thetomys* is annectant. The presence of the cuspule at the front of m^1 separates *Thetomys* from both *Pseudomys* and *Gyomys*.

KEY TO THE SUBGENERA OF *Pseudomys*

1. Without accessory cuspule anterior to the first loph of m^1 2
With accessory cuspule anterior to the first loph of m^1 ; size small *Thetomys*
2. Size large; feet not slender, m^3 little reduced *Pseudomys* (*sensu stricto*)
Size small; feet slender, m^3 much reduced *Gyomys*

PSEUDOMYS, SUBGENUS PSEUDOMYS GRAY

Pseudomys GRAY, 1832, Proc. Zool. Soc. London, p. 39.

The largest-sized subgenus of the "Australian native mice," *Pseudomys* may attain almost the size of *Rattus greyi* (e.g., *P. higginsi*) or it may be as small as *Melomys lutillus* (*P. fieldi*).

Stoutly built rodents with well-haired tails, which may be longer or shorter than the head and body, depending on the species. Feet not elongated, not unusually slender. Ears only moderately long.

Skull with narrow interorbital region and compressed elongated muzzle; rather narrow interorbital area. Zygomatic plate commonly but not invariably provided with anterior spine. Palate long, projecting behind m^3 for ± 1 mm., the incisive foramina long to very long, narrow, and parallel sided. Inter-molar palate not narrowed. Ectopterygoid fossae shallow and little raised above the palatal plane. Bullae small, often slightly shorter than the short tooth row.

Molars small and compact, their laminae scarcely sloping (unlike those of *Leggadina*). Sometimes (e.g., in *P. higginsi*) with a very slight trace of an anterior cuspule at the front of the first loph of m^1 .

TYPE: *Pseudomys australis* Gray.

In his definition of *Pseudomys* (*sensu stricto*), Thomas (1910) wrote "front edge of zygomatic plate concave, with a projecting point above, as in *Notomys*, though not so marked . . . Molars high, with heavy cusps . . . No antero-internal secondary cingular cusp on m^1 (except as an unusual abnormality)." The species listed by him as belonging to *Pseudomys* are *auritus*, *higginsi*, *lineolatus*, *murinus* (= *australis*), and *shortridgei*. Besides the species known to Thomas there are now others: *oralis*, *minnie*, *flavescens*, and *rawlinnae*. The projecting spine on the zygomatic plate is well developed in *lineo-*

latus, *murinus*, and *minnie*. It is weakly developed, or at least slightly rounded, in *auritus* and *oralis*, and it is undeveloped in *shortridgei*, *flavescens*, and *higginsii*.

The species groups of *Pseudomys* (*sensu stricto*) amount to three. The typical group, *australis*, is characterized by ear of medium size (± 17 mm. from crown); foot length (s.u.), 27; to 30 mm.; tail shorter than head and body; length of molar tooth row, 5.6 to 5.8. Here belong *murinus* (generally thought to be a synonym of *australis*), *minnie*, and *flavescens*. Derived from this group but with larger molars (6.4 to 6.6) and foot (29 to 31) come *lineolatus* and *oralis*. Also derived but representing a different stock with somewhat smaller teeth than *australis* are the central to western *shortridgei* and *rawlinnae*.

The second group includes only the very distinct species with large foot (31.5 mm.) and very long ears (22 mm.), *auritus*. The third also contains only one species, *higginsii* of Tasmania, which is large, has normal-sized ears, the foot reaching 35 mm., but the tooth row only 5.5 to 5.6 mm.

Pseudomys australis Gray

After careful study of the types I have reached the conclusion that *australis* from Liverpool Plains and *murinus* from the Namoi River must be regarded as alike, even down to the subspecies level. Very closely related to *australis* is *minnie* Troughton from Minnie Downs, some 500 miles northwest of the typical area of *australis*. To these I would add *flavescens* Troughton from about the same distance to the north-northwest of *australis*, despite its tendency to develop an anterior spine on the zygomatic plate. In all three the general characters of the skull and teeth are extremely uniform, while any distinctions in external characters may be related to environmental differences.

From the next species, *lineolatus*, *australis* is separable by its smaller teeth, shorter palate, and shorter incisive foramina.

Pseudomys australis australis Gray

Pseudomys australis GRAY, 1832, Proc. Zool. Soc. London, p. 39.

Hapalotis murinus GOULD, 1845, Proc. Zool. Soc. London, p. 78.

TYPE: Of *australis*, B.M. No. 232a,

adult, back of skull broken, from Liverpool Plains, New South Wales, collected by Cunningham. Of *murinus*, B.M. No. 53.10. 22.4, adult, back of skull broken, from plains near the Namoi River, New South Wales, collected by Gilbert.

Dorsal pelage of type of *australis* long and soft, now rather dark brownish gray. Under parts buff, the hairs with gray bases. Hands and feet buffy white. Tail with the hairs rather long, its color gray above, beneath white.

Skull moderately arched; the braincase flat and broad; zygomatic plate without anterior spine; nasals not exceeding premaxillae forward; incisive foramina long and very narrow. Coronoid process reduced.

The type of *murinus*, though faded, appears identical to that of *australis*. Width of rostrum, 4.4 mm.

Pseudomys australis minnie Troughton

Pseudomys minnie TROUGHTON, 1932, Rec. Australian Mus., vol. 18, p. 287.

TYPE: Sydney, No. M.5195, young male, from Minnie Downs (one of Lumholtz' old collecting stations), extreme northeast of South Australia, collected by L. von Reon Reese.

MATERIAL: Mulka, near Minnie, south-east of Lake Eyre, three (in alcohol).

Troughton described *minnie* as smaller than *auritus*. Color buffy gray, streaked with gray; under parts white, with the bases of the hairs gray. Ears large. Tail short, brown above, white beneath. Skull smaller than that of *auritus*, elongate, with narrow muzzle, wide braincase; the zygomatic plate with anterior spine; very long incisive foramina; narrow mesopterygoid fossa; large bullae. Teeth smaller than in *P. auritus*.

A comparison of the measurements of the types of *minnie* and *australis*, the former taken from Troughton, the latter made by me in London, shows a greater size resemblance than might be expected from the condensed description above. The biology and structure of *minnie* were elaborated by Finlayson (1939b, p. 94), and further records of it were published by him (1941).

Pseudomys australis flavescens Troughton

Pseudomys minnie flavescens TROUGHTON, 1936, Mem. Queensland Mus., vol. 11, p. 19.

TYPE: Sydney, No. M.6004, from Barcarolle Station, 135 miles south of Longreach, central Queensland, collected by F. L. Berney. Also six paratypes, two at Sydney, four at Brisbane.

Troughton distinguished this race from *P. a. minnie* by its finer, sparser pelage, richer coloring, and stouter skull with larger bullae. The zygomatic plate has only a trace of an anterior spine.

As in the case of *minnie*, I am unable to appreciate fully the size differences indicated. My table of measurements (table 5) in which both *minnie* and *flavescens* are compared with the type of *australis*, suggests a very close degree of conformity. The 2-mm. difference in the size of the feet can scarcely be considered strong evidence for distinctness.

***Pseudomys lineolatus* (Gould)**

Mus lineolatus GOULD, 1845, Proc. Zool. Soc. London, p. 77.

COTYPES: B.M. No. 57.10.26.1, adult, and B.M. No. 57.10.24.4, adult male (skull with back broken), both collected by J. Gilbert in "open plains," Darling Downs, "New South Wales" [actually south Queensland].

Dorsal color dark brownish gray. Under parts white, the bases of the hairs gray. Hands and feet buff. Tail gray above, white beneath. Tail scales not distinguishable but scale hairs long.

Skull of B.M. No. 57.10.24.4 with wide braincase, narrow interparietal, narrow interorbital area, and narrow rostrum (4.9 mm.). Zygomatic plate with small anterior spine. Molar palate narrow; incisive foramina long, parallel-sided, pointed in front, rounded behind.

Skull of B.M. No. 57.10.26.1 with postpalatal and postorbital parts missing.

This species has often been considered a synonym of *australis*, but its longer incisive foramina and tooth rows appear to distinguish the two.

***Pseudomys oralis* Thomas**

Pseudomys australis oralis THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 621.

TYPE: B.M. No. 47.1.20.2, young adult, from "Australia," purchased from Mr. Pamplin. Thomas wrote on the type label, "Agrees with No. 409 of Liverpool Museum from

Hastings River, east New South Wales." Iredale and Troughton (1934) give "coastal New South Wales."

This type specimen is somewhat larger than *australis*. The color and character of the pelage are much the same. Tail scales 13 per centimeter, the scale hairs three to four scale lengths. No anterior spine on zygomatic plate. Teeth very little worn. The supraoccipital bulge strongly developed posteriorly.

In view of the similarity of the sizes of teeth, feet, and ears between *oralis* and *lineolatus* I would associate this species with *lineolatus* rather than with *australis*. The exceptionally large size of the animal, as well as the length of the tail, 135 mm., compared with 100 to 120, seems to require specific distinction.

***Pseudomys shortridgei* (Thomas)**

Mus shortridgei THOMAS, 1907, Proc. Zool. Soc. London, for 1906, p. 765.

TYPE: B.M. No. 6.8.1.73, adult male, from Woyaline, east Pingelly, south Western Australia, 973 feet, collected by G. C. Shortridge, April 27, 1906. "Trapped near water."

MATERIAL: Sydney, No. M.1388, skull uncleaned; No. M. 1406, skull cleaned.

This mouse appears similar to *Gyomys fumeus* Brazenor and *G. occidentalis* of this paper, but is browner and the under parts are gray, with dark gray hair bases. Hair of type slightly coarser than in the eastern forms. Color now a generalized brown with an admixture of fuscous. Under parts buff, with the hair bases gray. Ears short. Tail dark above, buff beneath. Scale hairs long.

Skull with short muzzle. The interorbital area sharp-edged, the braincase rather narrow. Zygomatic plate without anterior spine. Mesopterygoid fossa proportionately wide. Bullae moderate.

***Pseudomys rawlinnae* Troughton**

Pseudomys rawlinnae TROUGHTON, 1932, Rec. Australian Mus., vol. 18, p. 289.

TYPE: Sydney, No. M.4642, adult male, from Rawlinna, Trans-Australian Railway, Western Australia, 235 miles east of Kalgoorlie, collected by A. S. Le Soeuf.

Dorsal color mottled light and dark brown; under parts buffy white, the bases of the

hairs dark gray. Tail grizzled sepia and white above, white beneath. Hands white. Feet white, tinged with pale pinkish buff.

Skull slightly shorter than in *shortridgei*; nasals longer and narrower. Front edge of zygomatic plate slightly excised, then rounded (no anterior spine). Teeth small.

Troughton considered this animal related to *P. shortridgei*, but with tail, ear, and foot proportionately longer and the teeth smaller.

Some years later Finlayson (1939b, p. 354) secured and reported on a number of specimens from Ooldea, 400 miles east of Rawlinna.

Pseudomys auritus Thomas

Pseudomys auritus THOMAS, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 607.

TYPE: B.M. No. 53.10.22.6, adult, from Lake Albert, South Australia, collected by Strange. Back of skull broken.

The dorsal color of the type gray brown, the pelage long and soft. Under parts now buff, the hair bases gray. Hands and feet dirty white. Tail dark above, white below, its scales not countable, but the scale hairs long. The large ears, with fine white internal hairs, are conspicuous.

Skull with nasals not exceeding the premaxillaries. Zygomatic plate provided with distinct anterior spine. The incisive foramina considerably longer than m^1-3 .

This appears to be the largest species of *Pseudomys* in Australia (*higginsii* of Tasmania is somewhat larger but has the molar tooth row shorter), and is particularly distinguished by the large size of its ears.

Pseudomys higginsii (Trouessart)

Mus leucopus HIGGINS AND PETTERD, 1883, Papers and Proc. Roy. Soc. Tasmania, for 1882, p. 174 (preoccupied).

Mus higginsii TROUESSART, 1897, Catalogus mammalium tam viventium quam fossilium, vol. 1, p. 473.

TYPE: Not known to exist (letter from Dr. J. Pearson, Director of Hobart Museum).

MATERIAL: Arthur River Mill, Tasmania (collected by H. C. Raven), seven; Tasmania (U.S.N.M.), eight.

The pelage of this species, which is confined to Tasmania, where Finlayson (1933) found it at 3000 feet, is long (16 mm.) and soft and almost without guard hairs.

The guard hairs in any case are rather poorly differentiated. The dorsal color is dark brownish gray; ventral color nearly the same, but the tips of the hairs more buffy. Hands and feet dirty white. Tail long, brownish gray above, white beneath, its scales 13 per centimeter, scale hairs long, about three scale lengths, becoming longer distally and forming a slight terminal pencil. Ears moderate in size, rather broad. Vibrissae, ± 50 mm.

Skull of unspecialized type; interorbital area quite narrow; braincase full. Zygomatic plate with upright anterior edge and displaying only a suggestion of a sharp angle. Incisive foramina, though elongate, proportionately shorter than in other species. Bullae not enlarged.

PSEUDOMYS, SUBGENUS GYOMYS THOMAS

Gyomys THOMAS, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 607.

Thomas' brief definition reads: "Size small. Skull as in *Leggadina* (anterior zygomatic plate straight or convex in front . . . Palatal foramina narrow. Pterygoid region peculiar, the parapterygoid fossae broad and very shallow, scarcely hollowed at all. . .). Molars normal; no anterior cingular cusp on m^1 , and the molar laminae . . . of the usual murine shape and position."

Thomas recognized three species: the type, *squalorum*, and *glaucus*. Five others have since been described: *berneyi*, *fumeus*, *apodemoides*, *desertor*, and *albocinereus*.

Gyomys lacks the anterior accessory cusp on m^1 . The lack of this cusp separates it from the very similar-appearing *Thetomys*. It is so much smaller than *Pseudomys* (*sensu stricto*) that it cannot be confused with that subgenus (except possibly with *occidentalis*). The ligulate process and notch of the post-tympanic hook of the squamosal are well differentiated in all the unbroken skulls I have studied, i.e., in *albocinereus*, *squalorum*, *apodemoides*, *glaucus*, *fumeus*, and *pumilus*.

I have before me specimens of three of the forms: *albocinereus* from south Western Australia, *apodemoides* from South Australia, and *occidentalis*, new species. The first two resemble each other closely. The interparietal of *albocinereus* is wider. The bulla in *apodemoides* is a little larger than in *albocinereus*, and

its tail slightly exceeds the head and body, while that of *albocinereus* is shorter. *G. occidentalis* is larger and much darker than either. It appears that *glaucus*, *pumilus*, and even *novaehollandiae* may belong in the same section as *albocinereus*, but *berneyi* has evidently much larger teeth, and *deserti* and *fumeus* are still larger. The last is especially distinguished by its very long tail.

TYPE: *Mus novaehollandiae* Waterhouse.

Pseudomys (Gymys) *novaehollandiae*
(Waterhouse)

Mus novaehollandiae WATERHOUSE, 1843, Proc. Zool. Soc. London, p. 146.

TYPE: B.M. No. 43.2.24.1, young adult, from "New South Wales," from the Gould collection, procured August, 1840. Iredale and Troughton (1934) give Yarrundi, upper Hunter River, as type locality. Back of skull missing.

MATERIAL: A reputed specimen at Melbourne (No. 2) with the whole of the inferior surface of the braincase missing.

Color of type brown above; the under parts dirty white, the bases of the hair gray. Hands and feet white, both very slender. The tail is stripped, though some of the vertebrae are still present.

Skull with short rostrum (its width, 3.2 mm.), large, full braincase; nasals not passing premaxillae anteriorly. The zygomatic plate slightly thrown forward, nearly straight, its top sharply rounded, not pointed. Incisive foramina long (very slightly passing the anterior roots of m^{1-1}) and not much narrowed. Bullae, though large, low and flat. Molar palate wide. Incisors opisthodont. Molars small. No accessory cusp on m^1 .

Pseudomys (Gymys) *pumilus* Troughton

Gymys pumilus TROUGHTON, 1936, Mem. Queensland Mus., vol. 11, p. 16.

TYPE: Sydney, No. M.6032, adult female, from Byfield, northeast of Rockhampton, collected in 1924 by A. Musgrave. There is a paratype.

Size very small. Color of type light brown. Under parts buff, with the hairs gray-based except on the throat. Hands, feet, and tail buffy white.

Edge of zygomatic plate straight, sharply rounded at top as in *novaehollandiae*. Incisive

foramina moderate in length, but broad. Bullae small. Mesopterygoid fossa narrow (compare, for example, the mesopterygoid fossa of *fumeus*).

Pseudomys (Gymys) *glaucus* Thomas

Pseudomys (Gymys) *glaucus* THOMAS, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 609.

TYPE: B.M. No. 92.8.7.2, adult male (body in alcohol), from southern Queensland, received from the Queensland Museum, Brisbane.

The type skin is in bad condition, and the colors are not properly distinguishable. The hind foot is very slender.

In the skull the nasals exceed the premaxillae. The zygomatic plate is straight, though rather narrow, and angled at the top to meet the zygoma. Incisive foramina moderately elongate, parallel sided, with both the back and the front slightly rounded. Mesopterygoid fossa narrow. Bullae small. Molars small, short, and broad.

This form appears to be closely related to *apodemoides* and *albocinereus*.

Pseudomys (Gymys) *albocinereus* (Gould)

Pseudomys (Gymys) *albocinereus*
albocinereus (Gould)

Mus albocinereus GOULD, 1845, Proc. Zool. Soc. London, p. 78.

TYPE: B.M. No. 44.7.9.16 (original no. 393.6), adult, from Perth, Western Australia, collected by Gilbert for Gould, October 15, 1842. Iredale and Troughton (1934) give Moore's River.

MATERIAL: "Australia" (A.M.N.H. No. 683), one; Beverley, East Pool, south Western Australia, young female, collected by G. C. Shortridge, January 25, 1906 (C.N.H. M. No. 35332), one.

Pelage of British Museum type long. Color brownish gray above; under parts dirty white, with the hair bases gray. Hands and feet dull white. Tail dark above, white beneath.

Skull of the type sharply different from that of *novaehollandiae*. Intertemporal region proportionately narrower. Nasals exceed premaxillae. Zygomatic plate wide, sloping, and without trace of spine. Incisive foramina moderately long and narrowed. Incisors orthodont.

Our specimen A.M.N.H. No. 683 (original no. 1502) is labeled "type" of *albo-cinereus*. It was received with the Verreaux collection, and the original Verreaux label reads "type de Gould." Clearly, the original number bears no relationship to the original number of the British Museum type, but may be the running number used in the Verreaux collection. The skull has now been cleaned and studied. It agrees almost exactly with the type in the British Museum. The only point of divergence is the molar series, which is slightly longer and broader.

The color of the more newly caught young female in the Chicago Museum is a silvery gray, and the rostrum is slightly shorter than in the type specimen.

***Pseudomys (Gyomys) albocinereus squalorum* (Thomas)**

Mus albocinereus squalorum THOMAS, 1907, Proc. Zool. Soc. London, p. 776.

TYPE: B.M. No. 6.10.5.6, adult male, from Bernier Island, Shark's Bay, Western Australia, collected July 4, 1906, by G. C. Shortridge.

Dorsal color of type light gray, with touches of dark brown. Under parts white, with gray-based hairs. Tail with narrow dark line along the dorsum for the first 30 mm., the rest and under side white. Hands and feet white. Feet very slender. Tail scales 15 per centimeter, the scale hairs two to two and one-half scale lengths.

Skull a little smaller than that of *albo-cinereus* and zygomatic plate lower. Incisive foramina distinctly shorter and narrower. Interparietal and braincase wide. Incisors strongly opisthodont.

***Pseudomys (Gyomys) apodemoides* Finlayson**

Pseudomys (Gyomys) apodemoides FINLAYSON, 1932, Trans. and Proc. Roy. Soc. South Australia, vol. 56, p. 170.

TYPE: Adelaide, No. M.3466, adult female, from Coombe, South Australia, latitude 35° 40' S., longitude 140° E.

MATERIAL: One topotype. Thirteen more topotypes are at Adelaide.

Fur of type long and lax. Color "light ashy blue-gray," brownish tints being nearly absent. Under parts with hair tips pure white but gray based. Ears moderately large. Tail

with upper parts mixed white and gray, its under parts white. Scale hairs about four scale lengths. Hands and feet white. Feet very small. Mammae, 0-2=4.

Skull long and narrow, with elongate muzzle. Incisive foramina long but not especially slit-like. Edge of zygomatic plate gently sloping. Ectopterygoid fossae moderately well developed. Mesopterygoid fossa not very narrow. Bullae moderate in size. Ligulate process and cleft of the post-tympanic hook of the squamosal are fully differentiated. No accessory cusp on m¹.

Finlayson, when later (1944) he prepared a detailed study on the life history of *apodemoides*, was inclined to regard *albo-cinereus* as its nearest relation.

***Pseudomys (Gyomys) berneyi* (Troughton)**

Gyomys berneyi TROUGHTON, 1936, Mem. Queensland Mus., vol. 11, p. 15.

TYPE: Sydney, No. M.6000, adult male, from Barcarolle Station, 135 miles south of Longreach, central Queensland, collected by F. L. Berney.

MATERIAL: Three paratypes are at Sydney and six more at Brisbane.

Color of type yellowish brown. Under parts white to the roots of the hairs. Ears small. Hands and feet white. Tail short, brownish above, white beneath. Mammae, 0-2=4.

Skull with full braincase and short, narrow rostrum. Incisive foramina very long, and narrow behind, much longer than in *novae-hollandiae* or *pumilus*. Nasals quite short. Bullae large.

***Pseudomys (Gyomys) fumeus* Brazenor**

Gyomys fumeus BRAZENOR, 1934, Mem. Natl. Mus. Melbourne, vol. 8, p. 158.

TYPE: Melbourne, No. C.197, adult male, from Turton's Pass, Otway Forest, Victoria.

The type is long furred and colored dorsally smoky gray. The under parts are grayish white, the bases of the hairs gray. Ear of medium size. Feet small, whitish. Tail gray above, white beneath, very long.

Skull with bullae small, the base of the skull very flat. Nasals surpass premaxillae. Interparietal rather narrow. Incisive foramina not very elongate, rather wide behind, and in general agreement with those of *novae-hollandiae* and *pumilus*. Zygomatic plate

straight and near the top curving gently to the base of the zygoma. No post-palatal spine. The mesopterygoid fossa comparatively broad.

***Pseudomys (Gyomys) occidentalis*,
new species**

TYPE: C.N.H.M. No. 34725, young adult, from Tambellup, south Western Australia, collected by J. Baldwin, 1930.

GENERAL CHARACTERS: A dark grayish form with white feet, strongly resembling a small example of *Pseudomys shortridgei*, but with much smaller teeth and bullae.

DESCRIPTION OF TYPE: A mixture of dark gray and yellowish buff dorsally, with a scattering of black guard hairs. The under parts grayish white, each hair with an ample length of fuscous at the base. Hands and feet white. Width of foot at base of fifth metatarsal, 3 mm. Tail blackish above to about 20 mm. from the tip, which is white; beneath buffy white. The tail hairs are long, about three scale lengths. Ears not much enlarged.

Skull with full braincase, slender rostrum, and narrow interorbital region. The nasal processes of the premaxillae considerably exceed the nasals posteriorly. Lacrimals prominent, elevated. Interparietal rather narrow. Zygomatic plate moderate, its anterior edge straight, a rather sharp angle at the top (not rounded). Palate not rounded, the intermolar space about two and one-half times the width of m^1 , the back of the palate slightly behind m^3 . Incisive foramina narrow, pointed at both ends, not reaching m^{1-1} . Mesopterygoid fossa narrow, 1.6 mm. Ectopterygoid fossae shallow, on a plane with the palate. Bullae longer than tooth rows. Coronoid process of mandible not reduced.

Incisors opisthodont. Molars of *Pseudomys* type; their laminae but little inclined, and m^1 quite lacking any trace of cuspules anterior to the first loph such as we see in *Leggadina* and *Thetomys*.

MEASUREMENTS: (Laboratory): head and body, ± 100 mm.; tail, ± 100 ; hind foot, 26; ear from crown, ± 12 . Skull: total length, 30.3; zygomatic width, 15; interorbital width, 4.1; interparietal, 7.7; breadth of braincase, 13; mastoid width, 10.5; length of nasals, 11; greatest combined

width of nasals, 2.6; breadth of zygomatic plate, 3; palatal length, 14.6; incisive foramina, 5.1 by 1.6; distance apart of m^{1-1} , 3; length of bullae, 5.1; length of m^{1-3} , 4.5; m^1 , 2.2 by 1.4; m^2 , 1.4 by 1.4; m^3 , 1.1 by 1.2. Length of mandible to articular process, 16.1; m_{1-3} , 4.6.

There is a somewhat larger paratype in which the skull is badly broken. The hind foot in this animal measures 29 mm.; the zygomatic plate, 3.7; bulla, 5.2; m^{1-3} , 4.6. The large size of the feet causes this species to differ from all other *Gyomys* except *fumeus*. From that species *occidentalis* is at once separated by its narrower interorbital region, braincase, and generally smaller skull as well as by its much smaller teeth (4.5-4.6:5.5).

***Pseudomys (Gyomys) desertor* (Troughton)**

Mus nanus WAITE, 1898, Proc. Roy. Soc. Victoria, new ser., vol. 10, pp. 127-128 (a misidentification).

Pseudomys (Gyomys) desertor TROUGHTON, 1943, Rec. Australian Mus., vol. 18, p. 293.

TYPE: Sydney, No. M.1306, a former alcoholic specimen, mounted, from Wycliffe Creek, central Australia. (Waite had four specimens, A-D. Which of them is the type of *desertor*? The four juvenals reported under "*Mastacomys*" in the "Report on . . . the Horn scientific expedition to central Australia, pt. 2, p. 406, are only doubtfully referable here.)

The specimens on which *desertor* was founded had been referred by Waite (1898) and Jones (1925b) to *Thetomys nanus*. The type and a paratype are so faded that color descriptions can have little value; they are light brown above, beneath buffy gray. Tail brown above, buff beneath.

Of the skull, Troughton writes, "The front edge of zygomatic plate . . . straight, not evenly concave as in Waite's figure, and the palatal foramina comparatively short and not projecting beyond the molar rows; more tapered posteriorly than in the figure. Molars normally murine in shape, without a trace of an anterior cingular cups on m^1 ."

Troughton almost certainly based *desertor* on one of Waite's two specimens from Wycliffe Creek. A comparison of the measurements given by the two authors suggests

that the type was Waite's specimen B, a male. Waite's illustration of the skull (fig. 4a-d), marked "X2," shows rather large bullae (± 5 mm.), full braincase, the zygomatic plate slightly concave in front but without point, incisive foramina parallel-sided but not greatly lengthened or narrowed, and m^1 without any trace of the extra cusp. Indeed the teeth are very like the teeth of *Rattus*. The total length of the skull taken from the drawing is ± 26.5 , approximately in agreement with the actual published measurements.

I leave this species provisionally in *Gyomys*, though, as pointed out previously, it is the only species in which the length of the bulla is less than the length of the tooth row. In this connection, Finlayson (1941) has reached the conclusion that *desertor* is a synonym of *nanus* (= *Thetomys*).

PSEUDOMYS, SUBGENUS THETOMYS THOMAS

Thetomys THOMAS, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 606.

Thomas' definition reads: "Size medium. Form of skull more normal [than that of *Pseudomys* (*sensu stricto*)], but the anterior plate of zygoma still concave in front. Palatal foramina fairly long, but not widely open. Pterygoid region normally murine. Molars fairly normal, but a distinct antero-lateral cingular cusp present on m^1 . Molar laminae not especially tilted up."

Under *Thetomys*, Thomas listed *nanus* (of Western Australia), *ferculinus*, *gouldii*, *gracilicaudatus*, and *praeconis*; *ultra* has been described since.

In *Thetomys*, compared with most *Gyomys* and *Pseudomys*, the bullae are large and consequently relatively close together. This is true of all species I have been able to examine, namely, *T. praeconis*, *T. ferculinus*, and *T. nanus*. In *T. nanus* the bullae are only about one-half the width of one bulla apart. But the same is true of some *Leggadina*, particularly of *L. hermannsburgensis*, and of one *Gyomys*, *G. pumilus*. In *Pseudomys* the bullae are proportionally smaller and more widely separated.

TYPE: *Mus nanus* Gould.

Not very much of taxonomic importance can be discovered from my set of measurements of *Thetomys*. There seem to be at least

two distinct lines, one with short rostrum, *gouldii* and *ferculinus* (nasals, 9.0 to 10.5 mm.), and one with long rostrum, *gracilicaudatus* (nasals, 12.0 to 12.3). Possibly the breadth of the zygomatic plate indicates the same grouping: *ferculinus*, 2.8 mm., and *gracilicaudatus*, 3.4. In that case *praeconis*, 3.0, would seem to belong with *ferculinus*, as it does geographically. *T. nanus*, too, so far as its few measurements can be compared, seems to belong with the other Western Australian forms.

Unfortunately I have not at the time of writing a single undoubted example of the subgenus but must rely upon notes and photographs based upon material studied earlier.

Pseudomys (*Thetomys*) *nanus* (Gould)

Mus nanus GOULD, 1858, Proc. Zool. Soc. London, p. 243.

COTYPES: B.M. Nos. 44.9.30.10, 44.9.30.11, adults, the second without skull, from Moore's River, Victoria Plains, Western Australia, received from the Gould collection. The skull of the second specimen not found.

Color of first cotype gray-brown above. Under parts buffy-white, the hairs gray based. Hands and feet dull white. Tail dark above, white beneath.

Skull strongly arched, especially in the nasal region. Braincase moderately broad. Rostrum swollen laterally (width, 4.8 mm.). Zygomatic plate narrow, excised in front, and provided with an anterior spine. Palate only moderately broad. Incisive foramina long (passing well within the anterior roots of m^{1-2}), not much narrowed. Mesopterygoid fossa of moderate width. Bullae large and close together. Incisors strongly opisthodont. A supplementary cusp anterior to the first loph of m^1 .

Under the name *nanus*, Finlayson (1941) has described in detail a series of specimens from south of the Musgrave Range, central Australia, and also finds *desertor* Troughton to be synonymous with that series. The position of the Musgrave Range is about 1000 miles from the type locality of *nanus*, so identity is in this case somewhat open to question. I have placed the measurements given by Finlayson for his specimen from

Koonapandi, south of the Musgrave Range, in my table of measurements (table 5) for *Thetomys* so that they can be readily compared with the cotype of *nanus*. Outstanding differences appear in the length of the incisive foramina and bulla in relation to each other and to the tooth row. Direct comparison of Finlayson's photographs of the skull from Koonapandi with mine of the type skull reveals the same type of distinctions. The greater size of the incisive foramina in the type, for example, is expressed by their extension backward between m^1 - 1 . The large, rather closely approximated bullae are essentially similar. The teeth (particularly the large m^3) also look alike, and the differences in lengths of the tooth rows may be due to differing methods of measurements (see Introduction). The flare of the zygomatic process of the maxilla is more abrupt in the type than in Finlayson's photographs. I cannot therefore endorse Finlayson's view that his species is equal to *nanus* (Gould).

***Pseudomys (Thetomys) ferculinus* (Thomas)**

Mus ferculinus THOMAS, 1902, Ann. Mag. Nat. Hist., ser. 7, vol. 10, p. 491.

TYPE: B.M. No. 2.10.10.7, young female in alcohol, from Barrow Island, northwest Western Australia, received from Perth Museum.

Pelage of type slightly coarse, gray brown above. Under parts dull white, with gray bases to the hairs. Ears rounded, not enlarged.

Skull rather short and with full braincase, its entire profile strongly and uniformly arched. Interparietal wide. Nasals slightly exceeding premaxillae. Incisive foramina of moderate size. Zygomatic plate well thrown forward, but without spine. Mesopterygoid fossa moderately narrow. Bullae less full and more widely separated than those of *nanus*. Incisors opisthodont; m^1 with supplementary anterior cusp.

***Pseudomys (Thetomys) praeconis* Thomas**

Pseudomys (Thetomys) praeconis THOMAS, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 608.

TYPE: B.M. No. 58.12.27.14, old female, from Peron's Peninsula, Shark's Bay, West-

ern Australia, collected by F. M. Rayner.

Skin of type mottled brownish gray; under parts white, with the bases of the hairs gray. Hands and feet dirty white. Feet very slender. Ears large. Tail long. Tail scales 13 per centimeter, the scale hairs three scale lengths.

Skull larger than that of *nanus* or *ferculinus* and much less arched. Nasals slightly exceeding premaxillae. Zygomatic plate with incipient spine. Bullae moderate in size. Incisive foramina parallel-sided, elongate, reaching to back of anterior root of m^1 . Incisors opisthodont. If the supplemental cusp was once present on m^1 it has been abraded off.

The form is divergent from other *Thetomys*. It may lack the cusp of m^1 and be closer to *Gyomys*.

***Pseudomys (Thetomys?) fieldi* (Waite)**

Mus fieldi WAITE, 1896, Report on . . . the Horn scientific expedition to central Australia, pt. 2, Zoology, Muridae, p. 403.

TYPE: Sydney, adult female, in alcohol, from Alice Springs, collected June, 1895. The skin somewhat resembles that of *Pseudomys minnie* (ears large).

Waite wrote, "fur of moderate length, remarkably fine and fluffy; general color warm sandy brown . . . under surfaces pure white, the bases of these hairs pale gray . . . Hands and feet white. Tail thin and very long . . . more so than head and body; a few short sandy hairs above, becoming darker distally, white below, hairs on tip black and somewhat longer . . . Scales 15 to the cm. Mammary 0-2 = 4."

Skull "utterly crushed . . . molar teeth intact and are very similar to those of the species next described [*Leggadina hermannsburgensis*] excepting that in m^1 the first [accessory] cusp is extremely small." The teeth, ear, and foot were illustrated (Waite, fig. 4c-f).

Troughton (1937, p. 186) restudied the crushed skull of the type. He found a complete zygomatic plate, which was deeply concave in front. The subsidiary cusp of m^1 , as seen in Waite's drawing, is present but rudimentary. Troughton concluded that *fieldi* was a *Pseudomys*.

Difficulty over placing *fieldi* in *Pseudomys*

lies in certain obviously very different proportions from those apparent in other species of *Pseudomys* (*sensu stricto*). Notable is the extreme length of the tail, the proportion of which to the head and body is given by Waite as 122:103.5. In no other *Pseudomys* is the tail even as long as the head and body. Two other divergent characters are the shortness of the foot (given by Waite as 23.5) and the shortness of the upper molar tooth row (5.0, according to Waite). I have placed it provisionally in *Thetomys* near Western Australian *praeconis*, a species with the tail long and the molars small.

Pseudomys* (*Thetomys*) *gracilicaudatus
(Gould)

Mus gracilicaudatus GOULD, 1845, Proc. Zool. Soc. London, p. 77.

TYPE: B.M. No. 58.11.20.3, adult male, back of skull broken, from Oakey Creek, Darling Downs, southern Queensland, collected by Gilbert.

Dorsal color of the type rather darker than in western species, dark brownish gray. Under parts buff, with the bases of the hairs gray. Hands and feet grayish white. Tail dark above, paler beneath, tail scales 14 per centimeter, scale hairs three to four scale lengths.

Profile of skull well arched. Zygomatic plate with anterior spine. Incisive foramina long, somewhat narrower behind than in front, extending to middle of first loph of m^1 . Incisors slightly opisthodont. Molars larger than in western forms; m^1 with supplementary cusp. Palate relatively narrow in correlation with the large size of the molars, its width inside m^{1-1} only about one and one-half times the width of m^1 .

Pseudomys* (*Thetomys*) *gracilicaudatus ultra
Troughton

Thetomys gracilicaudatus ultra TROUGHTON, 1939, Rec. Australian Mus., vol. 20, p. 281.

TYPE: Sydney, No. M.6407, adult female, from Mackay, Queensland.

A more yellowish representative of the typical grayish brown race from Darling Downs. Troughton states that the tail is shorter, the skull smaller, and the incisive foramina larger. There are five paratypes.

Pseudomys* (*Thetomys*) *gouldii
(Waterhouse)

Mus gouldii WATERHOUSE, 1839, The zoology of the voyage of H.M.S. "Beagle," vol. 1, Mammalia, p. 67.

COTYPES: B.M. Nos. 55.12.24.148, 55.12.24.149; No. 55.12.24.148 without skull, No. 55.12.24.149 adult female; both from north of Hunter's River, New South Wales, from the Gould collection.

MATERIAL: An unnumbered specimen without locality in Melbourne is marked "*gouldii*," but it may be another species.

Color of B.M. No. 55.12.24.149 now rather light brown. Under parts buffy white, with hairs gray-based. Hands and feet white. Tail scales 13 per centimeter, the scale hairs three scale lengths.

B. M. No. 55.12.24.148 is so faded that its dorsal color is now brownish yellow. Scales of tail 13 per centimeter, the hairs three scale lengths.

The skull of B.M. No. 55.12.24.149 is so greatly damaged that only the muzzle and a part of a mandible remain. I have photographs of the side of the muzzle and of the mandible. Rostrum narrow (width, 3.8 mm.); nasals not exceeding premaxillae and narrower (2.7 mm.) than in any other species. Incisors orthodont. The lower molar tooth row is approximately equal in length to that of *ferculinus* and of *praeconis*, and shorter than that of *nanus* and of *gracilicaudatus*.

If the Melbourne specimen is truly *gouldii*, then the zygomatic plate is excised, the palate moderately broad, the molars are rather large, and the incisive foramina essentially as in *nanus*. The rostrum, however, appears to be too broad and short for this specimen to be the same as *gouldii*.

LEGGADINA THOMAS

Leggadina THOMAS, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 606.

Thomas defined his subgenus *Leggadina* as follows: "Size small. Form of skull normal. Anterior zygomatic plate straight or convex in front, as in ordinary murines. Palatal foramina narrow. Pterygoid region peculiar, the parapterygoid fossae broad and very shallow, scarcely hollowed at all, the ectopterygoids bordering it externally low, flat,

not or scarcely raised up above the level of its floor; entopterygoids also much lower and less projecting than usual. Molars very variable, but always with a well-marked antero-internal cingular cusp on m^1 . In *P. delicatulus* this is small, in *hermannsburgensis* intermediate, and in *forresti* very large. In proportion to the development of this cusp the laminae are themselves tilted backwards internally, while the outer cusps are reduced in size."

TYPE: *Mus forresti* Thomas.

The species of *Pseudomys* (*sensu lato*) referable to *Leggadina* were listed by Thomas as *forresti*, *delicatulus*, *hermannsburgensis*, and *patrius*, but other forms since added are *messoria*, *mimula*, *bolami*, *brazenori*, and *waitei*. Ellerman (1941) separated *forresti* from all the other forms which he placed in the "*delicatula* group."

Leggadina is a genus of moderate-sized to very small mice. In all species the first loph of m^1 bears an anterior accessory cuspule. This one character separates *Leggadina* from all other native mice except *Thetomys*. All *Thetomys* except *T. praeconis* have large bullae placed close together. The only species of *Leggadina* in which the bullae approximate the condition of *Thetomys* is *hermannsburgensis*, and those two are distinguished by their incisive foramina, long and narrow in *Thetomys praeconis*, short and broad in *Leggadina hermannsburgensis*. However, the short, broad, incisive foramina are found only in the *delicatula-hermannsburgensis* group of *Leggadina*. In the *forresti* group they are narrow and elongate. In *Leggadina* there is never an anterior spine on the zygomatic plate.

I find two main groups within *Leggadina*, just as Ellerman suggested, but I would place *waitei* and *messoria* in the *forresti* group and limit the *delicatula* group to include only *delicatula*, *mimula*, *patria*, and the three subspecies forming *hermannsburgensis*. The groups are definable as follows:

KEY TO THE GROUPS OF *Leggadina*

1. Tail distinctly shorter than head and body; skull relatively long (total length, 23.6 to 25.2 mm.); width of interparietal, 7.5 to 9.0; palatal length, 12.8 to 14.1; incisive foramina lengthened, slit-like; posterior palatal foramina almost as long as m^2 ; molar tooth row large, 4.3 to 4.6. 2
2. Tail subequal in length to head and body; skull relatively short (total length, 20.0 to 23.7 mm.); width of interparietal, 6.2 to 8.5; palatal length, 9.8 to 11.8; incisive foramina normal to rather short and broad; posterior palatal foramina not enlarged; molar tooth row small, 3.5 to 3.8 (4.2 in *patria*) . . . 3
3. Nasals, 8.5 to 9.0 mm.; palatal length, 13.8 to 14.1 *forresti-waitei*
Nasals, ± 7.6 ; palatal length, ± 12.8 . . . *messoria*
3. Bullae normal, 3.8 to 3.9; m^{1-3} , 3.6 to 3.7 *delicatula*
Bullae normal, ± 3.8 ; m^{1-3} , ± 4.2 . . . *patria*
Bullae enlarged, ± 5.2 ; m^{1-3} , 3.5 to 3.7 *hermannsburgensis*

The *forresti-waitei-messoria* group, by definition typical of the genus, is apparently confined to middle Australia between west of the Gulf of Carpentaria and Spencer Gulf.

The *delicatula-hermannsburgensis* group has a wider, though overlapping range and reaches from South Australia to the northern parts of Arnhemland, the upper part of the Cape York Peninsula, and Inkerman, near Townsville on the northeast coast of Queensland.

Leggadina forresti (Thomas)

Mus forresti THOMAS, 1906, Proc. Zool. Soc. London, abstract no. 32, p. 6; 1906, Proc. Zool. Soc. London, p. 536.

TYPE: B.M. No. 6.3.9.39, old female, from Alexandria, latitude 19° S., Northern Territory, collected May 10, 1905, by W. Stalker.

The type is colored dorsally pale brownish gray, intermingled with touches of fuscous. The under parts are self-colored pure white. Hands and feet white. Tail brownish gray above, white beneath. Feet heavier than in other species.

Rostrum of skull short; braincase moderately full; interparietal wide and not very short; nasals not exceeding premaxillae. Zygomatic plate straight, little thrown forward. Incisive foramina moderately long, finely rounded in front, sharp-pointed behind. Posterior palatal foramina well developed, almost as long as m^2 . Mesopterygoid fossa very narrow. Bullae of moderate size. Coronoid process strongly developed. Incisors orthodont to slightly proödont. First upper molar with blade-like anterior accessory cusp.

Leggadina waitei Troughton

Mus gouldii? WAITE, 1896, Report on . . . the Horn scientific expedition to central Australia, pt. 2, Zoology, Muridae, p. 398 (in part), pl. 25, fig. 2a-f.

Leggadina waitei TROUGHTON, 1932, Rec. Australian Mus., vol. 18, p. 290.

TYPE: Sydney, No. M.5194, male "dried after long preservation and considerably faded," from Hart Range, near Alice Springs, latitude 23° S., central Australia, collected by T. Hodge-Smith. Which one, of Waite's original lettered series, is Troughton's type is not known.

Color today sandy buff. Under parts creamy white to the roots of the hairs. Hands and feet buffy white. Tail brownish dorsally, buffy white beneath.

Waite (1896 pp. 398-401) compared his four specimens (a-d) to the type specimen of *gouldii*. They are obviously different, as he himself suspected. The foot length of his animals (*waitei* Troughton) varies from 16.0 to 17.8 mm., while that of *Thetomys gouldii* (as defined by Waite) is given as 25.5 (c.u.). My own measurement of the foot (c.u.) of the type of *T. gouldii* was 27.5 mm. These last two measurements are sufficiently alike to indicate clearly that Waite's four specimens were not the same as true *gouldii*. The identity of the skull illustrated by Waite (fig. 2 a-d) is uncertain. The drawing is marked "X2," which would give the real skull a total length of ± 25 mm., with nasal length ± 9.5 .

With expressed doubt as to the correctness of his identification, Finlayson (1939a, p.101) discussed a specimen from Mulka, southeast of Lake Eyre, latitude 29° S., under the name *forresti*. An adult male and female from the same locality (A.M.N.H. Nos. 107392, 107393) have been carefully studied. Their measurements bridge to a large extent the differences between the types of *forresti*, *waitei*, and *messoria*. It is possible that the three would be better considered subspecies of a single species. The specimens are tentatively referred to the nearest northern form, *waitei*.

I have also photographs of two specimens, Sydney, No. M.5194 (the type), and Melbourne, No. R.13685, from Mulka, near Lake Eyre, both of which are marked *waitei*.

Finlayson (1941) described specimens from

the Peterman Range and Wallara, central Australia.

The nasal length in the very fragmentary cotype of *Thetomys gouldii* is 10.5 mm. In the genus *Leggadina* the longest nasal length known is only 8.5 (*forresti*), and the skull dimensions published by Waite for specimens e and d come well within the range of *Leggadina*. In fact they agree very closely with those of the type of *forresti* and are in general too large for the remaining, smaller species, except possibly *messoria*.

The type localities of *forresti* and *waitei* are so relatively close to each other that the possibility that they are synonymous must be considered.

The skull of the type of *waitei* much resembles that of *forresti* and of *messoria* in the long, narrow, incisive foramina which are drawn out and even narrower at the back than at the front, and the large size of the posterior palatal foramina, as long as m^2 and about 1 mm. in length. The Mulka specimens are rather larger than the type of *messoria*; in them the accessory cusp on m^1 is quite distinct.

Leggadina messoria (Thomas)

Pseudomys (Leggadina) messorius THOMAS, 1925, Ann. Mag. Nat. Hist., ser. 9, vol. 15, p. 670.

TYPE: B.M. No. 25.4.9.1, adult male, from Melrose, latitude 32° 45' S., Spencer Gulf, South Australia, collected in 1922 by F. Wood Jones.

Dorsal color of type light buff, mixed with a little fuscous. Under parts self-colored creamy white. Hands and feet white. Foot broad as in *forresti*. Dorsal surface of tail buff, under surface white. Tail scales 25 per centimeter, scale hairs three to four scale lengths.

Rostrum of skull rather short, braincase flat on top. Anterior edge of zygomatic plate straight. Incisive foramina quite long, narrow, finely rounded in front, pointed behind. No post-palatal spine. Mesopterygoid fossa narrow. Bullae of medium size. Incisors slightly proödont, the accessory cusp on m^1 large and blade-like.

Apparently related to *forresti*, but smaller.

Leggadina delicatula (Gould)

This is one of the smallest native rodents

in Australia and is distinguished structurally from the only slightly larger *hermannsburgensis* by its smaller bullae and less angular zygomatic plate. Two races are known, the typical one and the Groote Eylandt form *mimula*. Probably *patria* should be considered a third race.

The distribution of this tiny species is northern. The Archbold expedition has taken it as far north in the Cape York Peninsula as the Batavia River. It is common at Coen and occurs near Cooktown. De Vis (1884) recorded it at Kimberley, now known as Karumba.

These mice, with *patria* and *hermannsburgensis*, are distinguished from *forresti* and its allies by their smaller size, shorter and broader incisive foramina, and unenlarged posterior palatal foramina. The molars tend to be more attenuate and narrower, with m^3 smaller in proportion to m^1 . The anterior cuspule of m^1 is restricted to the interior front of the first loph. In the *forresti* group the cuspule tends to encircle the front of the first loph.

Leggadina delicatula delicatula (Gould)

Mus delicatulus GOULD, 1842, Proc. Zool. Soc. London, p. 13.

COTYPES: B.M. Nos. 42.5.26.17, 42.5.26.18, both adult, from Port Essington, Northern Territory, collected by Gilbert. The backs of the skulls are missing.

Dorsal color of cotypes brown. Under parts buffy white, with the hair bases gray except on the chest where in both specimens the hairs are self-colored. Tail scales 24 to 25 per centimeter, the scale hairs two scale lengths.

In both skulls the nasals exceed the premaxillae; the incisive foramina are rather long; the incisors are opisthodont.

The two skulls differ in that B.M. No. 42.5.26.17 has the accessory cusp of m^1 well developed and the zygomatic plate low, while B.M. No. 42.5.26.18 has the cusp reduced, or worn down, to a slight swelling and its zygomatic plate is high and well angled. Also, in B.M. No. 42.5.26.17 the ear is small and the tail scarcely paler beneath, while in B.M. No. 42.5.26.18 the ear is larger and the tail distinctly paler beneath.

Leggadina delicatula mimula Thomas

Leggadina delicatula mimula THOMAS, 1926, Ann. Mag. Nat. Hist., ser. 9, vol. 17, p. 634.

TYPE: B.M. No. 26.3.11.174, adult female, from Groote Eylandt, Northern Territory, collected by T. H. Wilkins, March 6, 1925.

Dorsal color of type dark grayish brown; under parts white, with gray bases to the hairs except one small spot of all-white hairs on the chest. Hands and feet white. Tail scales 23 per centimeter, scale hairs two scale lengths.

Leggadina patria (Thomas and Dollman)

Mus patrius THOMAS AND DOLLMAN, 1909, Proc. Zool. Soc. London, p. 791.

TYPE: B.M. No. 7.8.9.44, adult female, from Mt. Inkerman, southeast of Townsville, northern Queensland, 400 feet, collected July 27, 1907, by W. Stalker.

The size of the type is slightly larger and its pelage shorter than in *delicatula*. Color grayish brown, under parts white, with gray bases. Hands and feet white. Tail dark above, paler beneath; tail scales 19 per centimeter, scale hairs two scale lengths.

Skull with well-broadened braincase, slender muzzle, wide interparietal. The nasals slightly surpass the premaxillae. Zygomatic plate well thrown forward. Incisive foramina rather short; a well-defined post-palatal spine. Incisors opisthodont; the extra tubercle on m^1 is a small, blade-shaped structure.

This race appears to be coastal. Finlayson (1942) records one from 100 miles north of Rockhampton; and Troughton (1936), one from near Gladstone.

Leggadina hermannsburgensis (Waite)

Three races of this small southern species have been described. Just how "good" they are cannot be settled by me, and I have left them provisionally as Troughton set them up.

Leggadina hermannsburgensis is most closely related to *L. delicatula* and *patria*, but it is easily distinguished by its considerably larger bullae.

Leggadina hermannsburgensis hermannsburgensis (Waite)

Mus hermannsburgensis WAITE, 1896, Report on . . . the Horn scientific expedition to central Australia, pt. 2, Zoology, Muridae, p. 405.

TYPES: Paratypes, B.M. Nos. 97.1.8.1-97.1.8.3, adult male and two females (in alcohol), from Hermannsburg Mission, central Australia, collected by W. A. Horn. Troughton (1932, p. 292) designated Sydney, No. 1070a, lectotype of two cotypes.

OTHER MATERIAL: Topotype, one; Basedow Range, two; Tea-Tree Well, eight (all in the Museum of Comparative Zoölogy).

Colors, probably altered by preservative, dark above; beneath dull white, with hairs gray-based.

Skull shorter and wider than in *delicatula* and *patria*. Braincase very full. Front edge of zygomatic plate straight. Bullae very large and rather close together. Incisive foramina small. A well-developed post-palatal spine. Incisors strongly opisthodont. Accessory cusp of m^1 large, blade-like.

Finlayson (1941) has published a detailed analysis of this species.

Leggadina hermannsburgensis bolami
Troughton

Leggadina hermannsburgensis bolami TROUGHTON, 1932, Rec. Australian Mus., vol. 18, p. 292.

TYPE: Sydney, No. M.4938, adult female, skinned from spirit, from Ooldea, Trans-Australian Railway, collected by A. G. Bolam.

MATERIAL: A pair of topotypes in alcohol, A.M.N.H. Nos. 107401, 107402, and another topotype (M.C.Z. No. 27998).

This, according to Troughton, is a slightly larger race than *hermannsburgensis*, less "warmly" colored (possibly owing to fading by alcohol), and with larger ears and feet. The topotypes I have measured show only a very slight increase in size over true *hermannsburgensis*. Finlayson (1941) recognized this race.

Leggadina hermannsburgensis brazenori
Troughton

Leggadina hermannsburgensis brazenori TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 187.

TYPE: Melbourne, the type and 26 paratypes, from near the junction of the Murray and Darling rivers, collected in 1857 by W. Blandowski.

According to the describer, this race depends upon slight differences only: the tail is shorter, equal in length to head and

body, instead of rather longer. The palate is said to be longer than in the other races.

LORENTZIMYS JENTINK

Lorentzimys JENTINK, 1911, Nova Guinea, vol. 9, p. 174.

A genus of small, mouse-like rodents distinguished by numerous cranial peculiarities. The feet are very slender, and the tail is a little longer than head and body. The ear is greatly narrowed and tapers in the shape of a wedge to a rounded point. The mammary formula is 1-2=6.

The skull has a braincase that is full and rounded, particularly in the occipital area, and the squamosal roots of the zygomata are placed well forward. The dorsal profile is strongly arched. The interparietal is wide and fairly long. The rostrum is compressed, and the nasals are slightly exceeded by the projecting premaxillae. The zygomatic plate, though narrow, has the anterior edge upright and straight. The palate is elongate and extends far behind the molars, though the intermolar portion is not narrowed (the space between m^{1-1} is about three times the width of m^1). The incisive foramina are short and broad, and the septum between them is broad and strong. The posterior palatal foramina are exceptionally large and about equal to the length of m^2 . The pytergoid fossa is quite narrow, the ectopterygoid fossae are nearly obsolete and their roofs in a continuing plane with the palate, somewhat as in *Mus*. The bullae are moderately large for such a small skull and well rounded. The teeth are extremely small.

The upper incisors are pronouncedly proödont and have the "*Mus*" notch. The molar dentition, studied on younger specimens than Jentink had, is seen to represent a modified *Rattus* pattern, though the anterior parts of m_1^1 are much narrowed, as in some *Melomys*. The molar gradient is about normal for *Rattus rattus*.

TYPE: *Lorentzimys nouhuysii* Jentink.

The problem of the relationship of *Lorentzimys* is perplexing. I think we can rule out any possibility of alliance with the primitive Hydromyinae on account of the structure of the teeth (very distinct in A.M.N.H. No. 108454 and others). The elongate palate and the construction of the

pterygoid region generally are so strongly similar to those of *Mus* and *Leggadina* that the possibility of relationship naturally comes to mind. The anterior part of the palate, with the short incisive foramina and zygomatic plate (less advanced beyond in *Lorentzimys*), however, indicates marked differences. In *Lorentzimys*, too, m^3 is not yet so much reduced as in *Mus* and *Leggadina*. Despite those undoubted divergences I feel disposed to associate, rather remotely, *Lorentzimys* with *Pseudomys* and *Leggadina*.

Two species of this mouse have now been described: *nouhuysii* from the lowlands and *alticola* from the highlands and midmontane country of New Guinea. One of the best distinguishing characters is the form of the nasal bones, extremely broad at the base in *nouhuysii* and tapering at the base in *alticola*. There are additional characters of size and pelage. Probably the less specialized of the two species is *alticola*. Its characters in general, such as the form of the nasals and the shape of the ear conch, are less extreme.

Lorentzimys nouhuysii Jentink

Lorentzimys nouhuysii JENTINK, 1911, Nova Guinea, vol. 9, p. 174.¹

TYPE: Leiden (field no. 319), old male, from Bivak 2, Noord River, Netherlands New Guinea, 400 meters, collected October 10, 1909, by Lorentz expedition.

MATERIAL: Upper Fly River (5 miles above Palmer River Junction), 80 meters, one; Idenburg River, 4 kilometers southwest of Bernhard Camp, 850 meters, one.

Skin of type dull reddish brown; under parts buff, washed with brown, with gray-based hairs. Neck whitish beneath, with gray-based hairs. White around the mouth. Feet buffy white. Tail light fuscous, the tip with slight pencil of hairs. Tail scales 18 per centimeter, slightly wider than long, scale hairs three per scale, two to three scale lengths. Foot slender. Vibrissae, 65 mm. Ear markedly wedge-shaped, pointed, the tip slightly rounded.

Skull of type with large, full braincase, widely flaring zygomatic, short rostrum, very wide interparietal, anterior nares higher than wide and trough-like below. Zygomatic

plate straight and narrow as in *Hydromys*; nasals not exceeding premaxillae; bullae rounded, flat, not very small; mesopterygoid fossa narrow; alisphenoid prominences well marked. Squamosal roots of zygomatica only slightly flaring and placed far forward on braincase.

Incisors proödont, molars much worn. Back of palate 1 mm. behind back of m^3 . Mandible with ascending ramus very small and pointed; angular process not enlarged; articular process considerably drawn out.

This lowland form is apparently difficult to obtain. I trapped our specimen from the upper Fly River in a hollow log lying on the ground in dense rain forest.

The specimen from the Idenburg River has an extensive median suffusion of fawn in the ventral area, a condition barely indicated by a small chest streak in the Fly River animal. It is possible that the two will be separated when more specimens are known. Their geographical separation by the main chain of mountains in New Guinea suggests this course.

Lorentzimys alticola Tate and Archbold

Lorentzimys nouhuysii alticola TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 4.

TYPE: A.M.N.H. No. 150592, adult male, from 9 kilometers northeast of Lake Habbema, at 2700 meters, collected October 28, 1938, by W. B. Richardson.

MATERIAL: Paratypes, three; Bele River, 2200 meters, 18 kilometers northeast of type locality, three; ridge south of the Idenburg River at 1500 to 1800 meters, seven. Besides the foregoing from central New Guinea, I collected one from Baruari on the Astrolabe Range, 520 meters, and one from Kagi on the Moresby-Kokoda track on the south slopes of the main range at 1600 meters. Both appear to me like the Idenburg-Habbema series.

These mountain animals have the ears less sharply wedge-shaped than the lowland *nouhuysii*, gray instead of white cheeks, and the tail has black scale hairs instead of white ones. But what sets the two species apart primarily and has impelled me to make *alticola* a full species is the difference in the nasals, broad and truncate at the base in *nouhuysii*, much more tapered in *alticola*.

¹ The figures are extremely poor and inaccurate.

The pelage in *alticola* is long and soft, close and more crisp in *nouhuysii*. The under parts are grayish white, washed with light tawny, the hair bases fuscous. The cheeks are light gray.

LEPORILLUS THOMAS

Leporillus THOMAS, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 83.

Gregarious rats with large to very large ovate ears, soft dense fur, and rather weak feet with small claws (Troughton, 1923, pl. 5). The skulls have unshortened rostra, only moderately full braincase, and wide mastoid expanse, with the audital meatus very prominent. The supraorbital area is rounded, and the ridges are absent. The zygomatic plate is medium to broad, not excised at its anterior edge, and apparently without spine. The superior surfaces of the maxillary zygomatic processes are unbroadened (compare *Conilurus albipes*); the incisive foramina moderately lengthened but wide; anteorbital notch wide; palate narrowed (m^{1-1} about equal to the width of m^1); and bullae medium to large. The median posterior cusp found at the back of the lower first and second molars is present in many genera.

TYPE: *Hapalotis apicalis* Gould.

Thomas (1906) based the genus *Leporillus* on *apicalis* and *murinus* (a *Pseudomys*). He pointed out that while certain species of "*Conilurus*" (*sensu lato*) have the same number of molar cusps (two) as "*Mus*" (meaning *Rattus*), others have three internal cusps on both m^1 and m^2 , a postero-internal one being present which is absent in *Rattus*. This character of two internal (no postero-internal) cusps on m^1 or m^2 , together with the lengthened ear, served to define *Leporillus*. His generic definition reads: "Molars, as in *Conilurus*, without postero-internal cusps. Skull very much as in *Mus lineolatus* [a *Pseudomys*]. Hind feet normal, with the usual six pads. Species: *C. apicalis* and *murinus* [also a *Pseudomys*]." In Troughton's illustration (1923, pl. 5) the lower molars are compared. The largest teeth are in *jonesi*, the smallest in *apicalis*.

Thomas (1921c, pp. 618-620) restricted *Leporillus* by recognizing *murinus* as a *Pseudomys*. He had not realized yet that

conditor should be referred to *Leporillus*. He attributed to Gould, probably falsely, errors of description of *apicalis*. Troughton (1923) revised the genus. He showed, as did Thomas, that the postero-internal cusps of m^{1-2} are absent, as in *Rattus*. He constructed a key, setting off the pure white under parts of *apicalis* from the gray-based white under parts of *conditor* and *jonesi*, and separating the two last on length of ear, and characters of the zygomatic plate, foot, and teeth. He continued with detailed descriptions of the three species. Jones (1925b, pp. 326-337) also dealt extensively with the genus, using a more condensed key than that of Troughton.

I have photographs of the type skull of *apicalis*. The absence of the postero-internal cusps of m^1 and m^2 is clearly visible, and to that extent the dentition is *Rattus*-like. But also visible are the very large cusps formed by the union of the external and medial cusps commonly separate in *Rattus*, and this is the character that separates all the "rabbit-rats" from *Rattus*, namely, the appearance of only two rows of cusps instead of three. I have found no sign of a cuspule anterior to loph 1 of m^1 .

Of the three species, *apicalis* appears less specialized than *conditor* on account of the much enlarged bullae of the latter, and *jonesi* appears less specialized than *conditor* on account of its less elongated ear and less narrowed interparietal. Fusion of the external and median cusps in the first and second lophes of m^1 in *jonesi* appears to be incomplete (Jones, 1925b, fig. 217).

Apparently all three are house builders. The relative degrees of complexity of the houses could be compared with advantage.

Leporillus apicalis (Gould)

Hapalotis apicalis GOULD, 1853, Proc. Zool. Soc. London, p. 126; 1853, The mammals of Australia, pt. 5 (vol. 3), pl. 2.

COTYPES: B.M. Nos. 53.10.22.14, 53.10.22.15, adult and young females, from "South Australia," collected by F. Strange.

The color of the cotypes now is gray brown; the under parts are buff, with gray bases to the hairs. Ears large; hind foot grayish white, its width at the base of the fifth metatarsal, 6 mm. The tail is grayish brown above, white

beneath, its extreme tip white (in Gould's plate the terminal one-fourth of the tail is white); the tail scales 14 per centimeter, the scale hairs two and one-half scale lengths.

In B.M. No. 53.10.22.14, the rostrum is long and narrow, the braincase full and rounded, the interorbital region narrow. There is a small, unpaired bone placed medially at the junction of the frontals and the parietals, which is probably an anomaly. The rostral width is 6.1 mm. In the second cotype only the rostrum and teeth remain. Palatal foramina rather wide, the anteriorly projecting root of m^1 very thick. The coronoid process of the mandible is very low.

Troughton has specimens at Sydney. Finlayson (1941) has written an excellent redescription of *apicalis*, with data on distribution, and compared it with *conditor* which he had dealt with in 1939. After citing older records he reports it from the western MacDonnell Range and from near Mt. Crombie.

Leporillus conditor (Sturt)

Mus conditor STURT, 1849, Narrative of an expedition into central Australia, vol. 1, p. 120, with colored plate; vol. 2, app., p. 7.

Hapalotis conditor GOULD, 1849, The mammals of Australia, pt. 2 (vol. 3), pl. 6 and text.

TYPE: Not found. From plains near Laidley's Pond, flats of the Darling River, approximately latitude $32^{\circ} 45' S.$, longitude $142^{\circ} E.$, October, 1844, collected by Browne.

MATERIAL: A skin without skull (M.C.Z. No. 1883), received from Professor McCoy, Melbourne.

Of this animal Sturt wrote: "This ingenious little animal measures six inches from the tip of the nose to the tail, which is six inches long . . . length . . . of ear one and a quarter and one inch in breadth. Its fur of a light brown color and of exceedingly fine texture . . . an apparent disproportion in the size of the feet, which were large" (p. 121). It "inhabits the brushes of the Darling . . . builds a nest of small sticks . . . like an ordinary rat, only that it has larger ears" (p. 7).

Gould described "... its lengthened and broad hind feet, large ears . . . fur soft and silky . . . general color grayish brown, becoming a darker hue down the center of the head and back . . . under surface pale buff . . . slate gray at the base; a slight wash of rufous

between the ears . . . fore feet brown, hind feet pale brown; tail brown above, paler beneath."

The hind foot of the specimen in the Museum of Comparative Zoölogy is ± 43 mm.; its width at the base of the fifth metatarsal, 5.0 mm.; the large ear, ± 27 mm. from the crown. The tail, imperfect, is tapered, dark above, white beneath.

Interesting notes on nest construction, as well as on anatomy, were published by Finlayson (1939a, p. 111).

Unfortunately I have not seen a skull of *L. conditor*. Jones (1925b, pp. 326-337) shows drawings of the rather long-eared head and of the dorsum and the posterior basal portion of the skull. Compared with *jonesi*, *conditor* of Jones has longer ears, a rather squarish interparietal, and much larger bullae. Troughton (1923, p. 27) has in the Sydney Museum several specimens, including one that he believes to have been acquired by Krefft in 1861.

Leporillus jonesi Thomas

Leporillus jonesi THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 618.

TYPE: B.M. No. 21.7.3.2, adult female, from Nuyt's Archipelago, South Australia, collected in its nest by F. Wood Jones, November 23, 1920.

MATERIAL: Franklin Island (M.C.Z. No. 27997), one, skull only.

Color above grayish brown. Under parts buff colored, with the bases of the hairs gray. Hands and feet now buff, possibly discolored by preservative. Ear apparently considerably smaller than that of *apicalis*. Tail scales 16 per centimeter, the scale hairs three to four scale lengths.

Skull with back of braincase narrowed, the length of the narrow interparietal subtriangular instead of rectangular (in *conditor*) 6.5 mm. The rostrum (width, 7 mm.) heavier than that of *apicalis*. The zygomatic plate wider and less sloping. The incisive foramina are shorter; the bullae are larger, with the auditory meatus very large and heavily ossified. A study of the teeth and alveoli was made by Jones (1922).

MASTACOMYS THOMAS

Mastacomys THOMAS, 1882, Ann. Mag. Nat. Hist., ser. 8, vol. 9, p. 413.

Form vole-like, tail much shorter than head and body. Scale hairs of tail three times one scale length. Feet rather slender.

Skull heavy, well arched, and broad, with globular braincase, extremely narrow, rounded, elongate interorbital region, and lateral occipital prominence. Anteorbital slots broad. Zygomatic plate broad, with anteriorly projecting spine as in *Notomys*. Palate very narrow, grooved as in *Lenomys*, the width between m^{1-1} about one-half the width of m^1 . Back of the palate level with back of m^{2-3} . Incisive foramina elongate, slit-like, greatly narrowed at the back. Mesopterygoid fossa narrow. Ectopterygoid fossae shallow and *Mus*-like. Bulla of medium size.

Incisors somewhat opisthodont. Molars very large, with all laminae strongly inclined backward. In m^1 the first lamina has two cusps, the second three, and the third one. In m^2 the first lamina has one cusp, the second two and a slight accessory cusp, the third one. In m^3 the first lamina has one, the second two, the third one (extra large). The length of the body of m^1 is 3.4 mm., but the wear surface is only 2.7 mm. Dental ramus of mandible deep (7 mm.).

TYPE: *Mastacomys fuscus* Thomas.

Mastacomys fuscus Thomas

Mastacomys fuscus THOMAS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 9, p. 413.

TYPE: B.M. No. 52.1.15.15, young female, from Tasmania, collected by R. Gunn. Body in alcohol, skull cleaned; the tips of the nasals are broken off.

MATERIAL: None.

The type (in alcohol) is strongly vole-like, blackish brown, with ears moderate in size, and rounded. The width of the hind foot at the base of the fifth metatarsal, 5.4 mm. Mammae, 0-2 = 4.

Skull broad and heavy, well arched, and with well-rounded braincase. Interorbital region quite narrow. Rostrum 5.2 mm. wide. Incisive foramina slit-like, bullae small, mesopterygoid fossa moderate in width. Zygomatic plate with spine.

Finlayson (1933), in the most important paper yet written on this genus, reported in detail his rediscovery of it in 1931 in Tasmania at 3000 feet. Troughton (1948) recorded it from Gippsland in 1892 and in Otway

Forest at 1800 feet in Victoria. He personally obtained a specimen on Mt. Kosciusko in 1946.

Finlayson emphasized the very large size of the lacrimals, the almost tubular interorbital region, the short globular braincase, wide interparietal, and the shallow ectopterygoid fossae. He compared it with *Arvicola*.

Mastacomys mordicus Thomas

Mastacomys mordicus THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 10, p. 551.

TYPE: B.M. No. 22.10.1.3, subfossil, from a cave in the Mt. Gambier District, South Australia, collected by F. Wood Jones. A right upper mandible with zygomatic plate only.

MATERIAL: A substantial amount of topotypical material collected by Jones, which is now at the Museum of Comparative Zoölogy.

I examined and photographed the type in London. It is much smaller than *fuscus* as regards those few measurements that can be made (zygomatic plate, molar teeth). In any case, the tooth rows in this genus are measured with difficulty owing to the marked inclination of the laminae.

Troughton (1948) restricted this name to South Australian and Victorian specimens.

The following notes were made on the Museum of Comparative Zoölogy material: In the upper jaw fragments, the widths of the zygomatic plates measure: 4.4 mm., 4.2, 4.3, 4.0 (unworn teeth), 4.3, 3.6 (unworn teeth), 4.0, 4.4, 4.2, 4.3, 4.3, 3.1 (unworn teeth). The following are lengths of molar tooth rows taken at the alveolus level: 8.8, 9.8, 9.4, 9.4, 9.4, 9.2, 9.7, and in the one measurable juvenal with unworn teeth, 9.1. The worn crown surfaces measure: 8.0, 7.8, 8.2, 7.4, 7.4, 8.5 (old), 8.6 (very old). The wear surface of the young specimen is 7.3.

The anterior spine of the zygomatic plate was preserved in a number of the specimens. The backward inclination of the molar laminae becomes increasingly great from front to back, and the length of the wear surface increases as the animal becomes older and the crowns become worn down.

In the lower jaws, of which there are 37 left and 39 right tooth rows, the same thing is true except that the laminae incline forward instead of backward. Alveolar lengths in these

mandibles range from 8.4 to 8.9 and wear surfaces from 7.6 to 8.0.

The degree of variability in this series shows an almost complete bridge, as regards size of molars, between the larger *fuscus* and the smaller *mordicus*. There is, however, no zygomatic plate so narrow as that of the type of *mordicus* (3.1 mm.), while several are as broad as in *fuscus* (4.3 mm.).

The true character of the molars of this probably extinct strain of *Mastacomys* can be studied from the few unworn tooth rows. There is a tendency for the outer and median cusp rows to fuse, as in the "rabbit-rats." Almost the same degree of coalescence of the cusps has been reached as in *Conilurus*. This fusion of external and median cusps remains incomplete only in the second loph of m^1 and the first of m^2 . The obsolescence of the postero-internal cusp in all three molars shows a step beyond *Conilurus* and appears to equal what we see in *Leporillus*, *Notomys*, *Leggadina*, and other genera.

NOTOMYS LESSON

Notomys LESSON, 1842, Nouveau tableau du règne animal, mammifères, p. 129.

Podanomalus WAITE, 1897, Proc. Roy. Soc. Victoria, new ser., vol. 10, p. 117.

Thylacomys WAITE, 1897, Proc. Roy. Soc. Victoria, new ser., vol. 10, p. 121 (preoccupied).

Ascopharynx WAITE, 1900, Ann. Mag. Nat. Hist., ser. 7, vol. 5, p. 222.

Markedly saltorial Murinae of small or moderate size, having elongate ears, feet, and tail, the last carrying a pencil of long hairs. Mammary formula, 0-2=4. Hairs and skin of inferior surface of neck and anterior sternum more or less modified and glandular in males, less so or not at all in females.

Skull arched, chiefly in the parietal region, lightly built, with compressed muzzle, wide interorbital region without marked temporal ridges, full rounded braincase, moderately broad interparietal. The lacrimals are very large and prominent. The front of the zygomatic plate is commonly excised, and its anterior edge is usually provided with a forwardly projecting spine. The upper surface of the base of the zygomatic process of the maxilla is greatly broadened as in *Conilurus albipes*. The palate is not narrowed except in *Notomys amplus*. The incisive foramina,

though long and reaching back to the level of the first loph of m^1 , are only moderately narrowed. The posterior palatal foramina are very small, and there are no pits anterior to the pterygoid hamuli. There is often a post-palatal spine. The mesopterygoid fossa, which may be normal or moderately narrowed, is not roofed, but instead is strongly fenestrated as is the whole sphenoid area. Fenestration of the median presphenoid area, also, results in such enlargement of the optic foramen and foramen lacerum that one can readily see through from side to side, as in *Zyzomys* and *Conilurus*. The mesopterygoid fossa is narrow, and the ectopterygoid fossae are very shallow as in *Mus*, *Mastacomys*, *Lorentzimys*, and *Leggadina*. The bullae are moderately large, their length exceeding the length of the tooth row. The coronoid process of the mandible is much reduced.

The incisors are in general opisthodont. In *N. cervinus* they are weakly grooved. The molars display that condensation of the outer and median rows of cusps which is so characteristic of many Australian native genera. Precisely the same two lophs (the second of m^1 and the first of m^2) as in *Mastacomys* and other genera show the fusion of their labial and mesial cusps to be incomplete, and the internal row of cusps shows absence of the postero-internal one exactly as in *Leporillus* and *Mastacomys*. There may be development of cuspules anterior to the first loph of m^1 as in *Pseudomys*, notably in *Notomys mordax*. Jones (1922) published an account with figures of the teeth and root system of *N. "cervinus."*

TYPES: Of *Notomys*, *Dipus mitchellii* Ogilby. Of *Podanomalus*, *Hapalotis longicaudata* Gould. Of *Ascopharynx*, *Hapalotis cervinus* Gould.

Work on the genus was done by Waite (1898) and by Thomas (1921b). It was briefly revised by Jones (1925a) and more extensively by Brazenor (1934). The latter concluded, I think mistakenly, that the shape of the mesopterygoid fossa and of the pterygoids had no systematic significance. Much important work on *Notomys* has been done since by Finlayson (1939b, 1940).

There are three groups of small species and three of large. The typical group of *Notomys* (*mitchellii* and allies) consists of small-

sized and small-toothed animals with hind foot, ± 35 mm.; m^{1-3} , 5.0; length of m^1 , 2.6; length of palate, 15.5 to 16.0; and length of incisive foramina, ± 6.0 . Here may be placed tentatively *macropus*, *alutacea*, and *gouldii*. The glandular area may be present both on the neck and on the prethoracic area, but it appears that no throat sac is developed.

Finlayson (1940) has shown that *alexis* has glandular hair both on the throat area, where a pouch is developed, and on the anterior part of the thorax. The species is in general rather smaller than *mitchellii*, and its skull has the spines of the zygomatic plate enlarged and almost hook-like, short incisive foramina, and the hamuli on either side of the mesopterygoid fossa thickened, cellular, and rather straight. Here, besides *alexis*, belong *everardensis*, *aquilo*, *reginae*, and probably *richardsonii*.

The *cervinus* group apparently has the glandular hair confined to the neck, where a well-developed pouch may often be seen. *Notomys cervinus* proper has weakly grooved incisors, somewhat short nasals, the spine of the zygomatic plate little pronounced, and a rather open lyrate outline for the mesopterygoid fossa. The pterygoid hamuli are less thickened than in the smaller *alexis*. When Jones (1925a) described *fuscus* he believed that a positive gap existed between species having throat pouches and species without them. Finlayson's observations have more or less closed that gap. Jones' *fuscus* was distinguished from "*cervinus*" of Waite (*aistoni*, *alexis*, or *mitchellii*) by differing color and the absence of a hallucal pad. Our paratype of *aistoni* agrees with the series from Dickaree which I have referred to *mitchellii*. I am therefore placing *aistoni* with *cervinus*.

Following the three groups just discussed there remain only considerably larger species in which the length of the hind foot is 40 mm. or more, instead of the 29 to 37 mm. in small species. These larger *Notomys*, few as they are, fall also into three groups: the first containing *sturti*, *megalotis*, and *mordax*; the second *longicaudatus*; and the third *amplus*. The alliance of *sturti*, *megalotis*, and *mordax* is to be regarded as provisional, but one cannot doubt the distinctness of *longicaudatus* and *amplus*. In *sturti* some of the skull dimensions do not greatly exceed those of *gouldii*, the largest of

the first group, though its incisive foramina are much longer (7.3:6.1); but length of the foot (s.u.) of *sturti* is 44 mm., compared with 36 in *gouldii*. In *megalotis* the ear from the crown is about 25 mm. and the foot length ± 40 mm. Possibly *mordax* from the Darling Downs, founded on the skull only, can later be related to *sturti*, though its teeth are again larger, its palate is longer, and its incisive foramina are shorter.

The very largest species of *Notomys* are *longicaudatus* and *amplus*. In these the foot measures 46 and 42 mm., respectively; the ear, 22 and 25 mm.; the molar series, 6.6 and 7.5 mm.; the palate, 20.2 and 21.4 mm.; the incisive foramina, 8.6 and 7.9 mm.; the bulla, 9.0 and 8.1 mm.

The distance between m^{1-1} in the five forms just discussed, usually less than in the small forms, is: *megalotis*, 3.6 mm.; *sturti*, 3.2; *mordax*, 3.4; *longicaudatus*, 4.3; *amplus*, only 3.1.

I do not believe that *amplus* and *longicaudatus* are very closely related to each other on account of the differences in their palatal width (see above), width of zygomatic plate (4.5:3.9), interparietal width (10.3:7.3), length of bulla (8.1:9.0), and m^{1-3} (7.5:6.6).

A form of *Notomys* has recently been discovered by Dr. David H. Johnson on Groote Eylandt in the Gulf of Carpentaria.

Notomys mitchellii (Ogilby)

Notomys mitchellii mitchellii (Ogilby)

Dipus mitchellii OGILBY, 1838, Trans. Linnaean Soc. London, vol. 18, p. 130.

COTYPES: Sydney, No. R.74, from Murray River [Iredale and Troughton (1934) give: "reedy plains at the junction of the Murray and Murrumbidgee Rivers"], New South Wales.

MATERIAL: Dickaree, 40 miles northwest of Birdsville, southwest Queensland, six, and, in alcohol, 18; Birdsville, in alcohol, one.

Pelage of cotypes very long; ears elongate, large. Feet slender, saltatorial; tail tufted; fore limbs short, slender.

Skull (damaged), rostrum narrow and parallel-sided, intertemporal region narrow; zygomatic plate with an anterior spine; incisive foramina slit-like; posterior palatal foramina small.

Discovery of this mouse is recorded in Mit-

chell (1838, p. 143). Ogilby's original description of *mitchellii* was based on a sketch of the animal sent him by Mitchell, so his work served chiefly to establish the name. Thus, on a purely technical basis, one can question whether the Sydney "cotypes" are such at all, for, though they served as a basis for Mitchell's sketch, Ogilby, who proposed the name, never saw them.

When Jones (1925a, pp. 2-3) discussed *Notomys mitchellii*, he implied that it had no gular pouch. He had been notified by Troughton, who had examined the two cotypes in Sydney: "I feel reasonably sure that the character is not present in the two *mitchellii*." Of course those two specimens may be females. Later, Brazenor (1934, p. 78) stated, "Gular area defined by silky white, solid hair." His conclusions were based on a series of near topotypes collected in 1857 by Blandowski as well as on others from other localities too remote to be valid for present consideration, namely, the establishment of the gular-pectoral condition in *mitchellii*. Finlayson (1939b, p. 360) described in detail the condition in what he believed to be, and what probably was, *N. mitchellii macropus* from Ooldea, 400 to 500 miles west of the type localities of *mitchellii* proper and of *macropus*. He found gular and sternal glandular areas separated or partly separated by a very narrow band of normal skin and hair. There seems never to be a sunken throat pouch. This condition in all probability represents the state of the skin glands of the neck and chest in *mitchellii*, as contrasted with the *alexis* and *cervinus* groups.

Notomys mitchellii macropus Thomas

Notomys mitchellii macropus THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 540.

TYPE: B.M. No. 55.12.24.361, unsexed adult (probably female), probably from Kangaroo Island, collected by Dr. J. B. Harvey before December 3, 1841. Iredale and Troughton (1934) give Port Lincoln, South Australia.

Pelage of the type long and soft, now a mottled grayish brown. Under parts white, with bases of the hairs gray. Hands and feet white. Width of foot at base of fifth metatarsal, 3.2 mm.; length from heel to end of metatarsal, 27.5 mm. Tail dark above, white beneath, with a brush of hairs 10 mm. in length. Tail scales about 11 per centimeter.

Back of skull and nasals of type broken. No mandible found. Width of muzzle, 4.1 mm. Zygomatic plate with well-developed anterior spine. A slight post-palatal spine. Incisors slightly opisthodont. Mr. Morrison-Scott, who kindly examined the incisors for me, writes: "The type of *N. mitchellii macropus* has no sign of a groove [on the incisors]. The front of the incisor is slightly flattened and that is all." Molars without accessory tubercles.

Finlayson pointed out on his specimens from Ooldea, which with some reservations he referred to *macropus*, that the gular and sternal glandular areas become confluent in some individuals, to form an hourglass-shaped glandular area, while in others the two parts of the "hourglass" were separated by non-glandular body skin, and hair. Unfortunately it may not be possible yet to be sure of the identity of typical *macropus*, partly because its type locality is uncertain and partly because its type specimen is not sexed, although apparently it is a female, as it is without noticeable glandular areas on neck or chest.

Notomys mitchellii alutacea Brazenor

Notomys mitchellii alutacea BRAZENOR, 1934, Mem. Natl. Mus. Melbourne, vol. 8, p. 79.

TYPE: Melbourne, No. C.38, female, from Ooldea, Trans-Australian Railway.

A reddish-haired form with the bases of the dorsal hairs "faded brown rather than gray." Under surface "yellowish white, hairs basally a faded brownish-gray Gular glandular area well defined; clothed with solid silky hair. . . . Hallucal pad present."

My photograph of the type skull shows a strong, hook-like projection of the zygomatic plate, narrow incisive foramina, and a moderately elongate rostrum with elongate nasals. These characters point towards *mitchellii* and away from the groove-toothed *cervinus*.

It is possible that Finlayson's "*macropus*" from Ooldea equals *alutacea*.

Notomys gouldii (Gould)

Hapalotis gouldii GOULD, 1853, Proc. Zool. Soc. London, for 1851, p. 127.

TYPE: B.M. No. 7.1.1.135, old adult, collected by Gilbert in Western Australia and

received from Tomes. Back of skull missing.

MATERIAL: Toolbrunup, adult male, collected September 13, 1931, by J. Baldwin (C.N.H.M.), one.

Color of type almost exactly as in *richardsonii*, but some dark brown on the back and on the dorsal surface of the tail. Under parts white, with gray bases. Width of foot at base of fifth metatarsal, 3.2 mm.; length from heel to tip of metatarsal, 27 mm. Tail scales 11 per centimeter, scale hairs about three scale lengths.

Skull as in *richardsonii*, but mesopterygoid fossa rather narrower and teeth considerably larger. The braincase is moderately broad. There is a post-palatal spine.

Iredale and Troughton (1934) make this name a synonym of *richardsonii*, though the longer tooth row makes the propriety of their action dubious.

The fine specimen in the Chicago Natural History Museum leaves no room for doubt as to the distinctness of *gouldii* from *richardsonii*. The dimensions of the skull almost exactly match those of the type, and the specimen differs from *richardsonii* in the same particulars. There is a distinct antero-internal cuspule on the first loph of m^1 .

The color of the pelage of the Chicago specimen is a light brownish gray, darkened by the addition of fuscous along the back for a width of about one-half inch. Beneath, the backwardly pointing, flat-lying hairs of the throat and chest are glistening silvery white to the roots. The continuity of the appressed glandular hairs is broken at the level of the upper part of the throat by a circular area of glandular skin bearing scanty, soft, erect hairs. Posterior to the thorax the hairs are gray-based. The white hairs inside the limbs have gray bases.

Finlayson also (1937, p. 362) suspected that a quite close relationship exists between *N. gouldii* and *N. mitchellii*.

Notomys alexis Thomas

Notomys alexis alexis Thomas

Notomys alexis THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 316.

TYPES: Of *alexis*, B.M. No. 6.3.9.65, old female, from Alexandria, southwest of Alroy, Northern Territory, 800 feet, collected July

29, 1905, by W. Stalker. Of *fuscus*, from Ooldea, not seen.

MATERIAL: A female paratype or topotype, collected by Stalker, August 1, 1905 (M.C.Z. No. 14881); Tennant's Creek, one, in alcohol; Reedy Creek, central Australia, one, in alcohol; Tea-Tree Well, Northern Territory, male and female (M.C.Z.), two.

Pelage of type less dense than that of *mitchellii* and color brown, slightly mixed with fuscous above. Under parts white, with gray hair bases except on chest and neck where white to roots. Hands and feet white, the width of foot at base of fifth metatarsal 3 mm. Heel to end of metatarsal, 23.5 mm. Tail brown above, white beneath, with terminal pencil of hairs. Tail scales 12 per centimeter, hairs three per scale.

Skull (nasals broken) with very full braincase; rostral width, 4.2 mm.; zygomatic plate with strongly developed, hook-like anterior spine. Maxillary root of zygoma broadened. Incisive foramina moderate; bullae quite large. The pterygoids are straight, parallel, and distinctly thickened and cellular. Incisors opisthodont. Tubercle for insertion of temporal muscle on mandible not developed. A cuspule on the first loph of m^{1-1} in topotype at the Museum of Comparative Zoölogy.

In the specimens from Tea-Tree Well there is no cuspule on loph 1 of m^1 . The young male has no glandular pectoral area but in the region of the throat pouch an oval area of thin skin densely clad with backwardly growing pure white hairs, doubtless to become the sunken throat pouch in adulthood.

Sixteen years before describing *alexis*, Thomas (1906) had recorded Stalker's specimens as "*mitchellii*."

Finlayson (1940), on the basis of much field work in the center of Australia and a series of 132 specimens, analyzed the characteristics of this species in great detail. He showed that the species combines the throat pouch of *cervinus* with "a well-marked sternal tract as in *mitchellii*." He also showed that both the gular tract in rudimentary form and the sternal tract occur occasionally in females (p. 129). The hallucal pad may be present or absent (p. 130).

Notomys alexis reginae Troughton

Notomys alexis reginae TROUGHTON, 1936, Mem. Queensland Mus., vol. 11, p. 20.

TYPE: Brisbane (field no. 54), from Barcarolle Station, 135 miles south of Longreach, central Queensland, collected by F. L. Berney.

Paler than *alexis*. The white under parts show only a trace of gray at the bases of the hairs. Skull with interorbital region narrower, nasals and bullae smaller than in *alexis* according to Troughton.

Notomys alexis everardensis Finlayson

Notomys alexis everardensis FINLAYSON, 1940, Trans. Roy. Soc. South Australia, vol. 40, p. 133.

COTYPES: Adelaide, No. M.3685, adult male; No. M3673, adult female, from Everard Range, approximately latitude 26° 50' S., longitude 132° 15' E. Finlayson had a series of about 40 specimens.

MATERIAL: Henbury, Finke River (A.M.N. H. No. 107399), one.

Finlayson indicates that the pelage is longer and more heavily grizzled than in *alexis*, the basal gray darker, the skull of heavier build.

Notomys richardsonii (Gould)

Hapalotis richardsonii GOULD, 1853, Proc. Zool. Soc. London, p. 127.

TYPE: B.M. No. 43.8.21.3, adult male, from Swan River, Western Australia, collected by Dr. Richardson. Skull with back of braincase broken.

Pelage of type long and soft. Dorsal color a mixture of brown and gray, the under parts white, with the hair bases gray. A functional throat gland. Ears rather larger than in *Notomys m. macropus*. Hands and feet white, the width of the foot at the base of the fifth metatarsal, 3.1 mm.; the length from the heel to the tip of the metatarsal, 26.5 mm. Tail brown above, white beneath; tail scales 11 per centimeter, the hairs three to four scale lengths.

Skull with broad, full braincase, rather wide interorbital region, and narrow rostrum (3.6 mm.). Nasals extending forward beyond premaxillae. Zygomatic plate with strongly developed anterior spine; the zygomatic processes of the maxillae broadened. Incisive foramina moderate, their posterior ends level with the anterior edge of the alveolus of m¹. Posterior palatal foramina minute.

This form, which has been placed by authors in the synonymy of *gouldii*, is certainly different. Its association here with *alexis* is

provisional, but the presence of the functional throat gland combined with the animal's small size and the characters of its skull supports this action.

Notomys aquilo Thomas

Notomys aquilo THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 540.

TYPE: B.M. No. 67.9.17.2, old male?, from "Cape York," northern Queensland, collected by J. T. Cockerell. Troughton (1939a) assumed, perhaps unwarrantedly, that Cockerell secured it at Somerset, at the extreme tip of the peninsula. The back of the skull is broken.

Skin of type very similar to that of *alexis*, but with a strongly developed glandular area on the throat, the hairs of which converge inward and backward towards a median line. Color as in *alexis* but the pelage shorter and thinner. Hind foot with width at base of fifth metatarsal 3.1 mm. Heel to end of metatarsal, 26 mm. Tail scales 11 per centimeter, scale hairs two to two and one-half scale lengths.

Skull similar to that of *alexis* in the pterygoid area, but with considerably longer and broader incisive foramina and slightly smaller teeth. The foot is notably longer.

Despite these differences, *aquilo*, in my opinion, is nearer to *alexis* than it is to either *mittellii* or *cervinus*.

Notomys cervinus (Gould)

Hapalotis cervinus GOULD, 1853, Proc. Zool. Soc. London, for 1851, p. 127; 1853, The mammals of Australia, pt. 5 (vol. 3), pl. 10.

Podanomalus aistoni BRAZENOR, 1934, Mem. Natl. Mus. Melbourne, vol. 8, p. 84.

TYPES: Of *cervinus*, B.M. No. 53.10.22.7, adult, from South Australia at latitude 29° 06' S., and about longitude 141° E., which is virtually at the junction of Queensland, South Australia, and New South Wales, collected by Sturt, March 26, 1845. Of *aistoni*, Melbourne, No. R.13740, rather old male, from Mulka, east of Lake Eyre, collected by G. Aiston.

MATERIAL: Roseberth, 25 miles north of Birdsville, southwestern Queensland, five skins with skulls, six in alcohol; Birdsville, seven, in alcohol; topotype of *aistoni*, one.

The type of *cervinus* has the ears nearly as large as those of the type of *Notomys ma-*

crotis. Pelage soft and long, now pale yellowish brown; the under parts white, with gray bases. Hands and feet white, the hind foot short compared with that of more typical *Notomys*, its length from heel to tip of metatarsal only 23 mm. (total length, 33); its width at the base of the fifth metatarsal, 3.3 mm. Tail buff above, white beneath, the tip missing. Tail scales 13 to 14 per centimeter, hairs about three per scale.

Skull of type (nasals broken, palate crushed, back of skull missing) with braincase rather full; width of muzzle, 3.9 mm.; zygomatic plate rather narrow, its spine short and small; incisors slightly opisthodont and weakly grooved; molars small. Mr. Morrison-Scott writes, "the upper incisors grooved, but so slightly that it amounts to little more than a flattening of the front surface bounded on each side by an extremely low ridge."

Pelage of type of *aistoni* light gray, streaked with fuscous. Under parts whitish, all hairs gray-based. Ears large, 18 mm. from crown (dry). Tail brush-tipped, dark above, white beneath. Foot grayish white, its width at the base of the fifth metatarsal, 3.5 mm.; its length, 34 mm.

Skull with short, wide braincase, short muzzle. Zygomatic plate with small spine. Bulla rather large.

In our topotype the spine of the zygomatic plate is barely pointed; the incisive foramina are long and broad (6 mm. by 2); the mesopterygoid fossa is lyrate and margined on either side by the delicate compressed hamuli; the tooth row length is 5.2 mm. The grooves of the incisors are extremely weak.

Finlayson (1940) suspected that *aistoni* equaled the true *cervinus* Gould. The species was dealt with extensively by him (1939a, p. 103) and was touched upon again later (1939b, p. 358).

Finlayson (1940) believed that the series of *Notomys* from Wantapellya identified by Waite (1915) as *cervinus* was referable in reality to *alexis* and that Waite's earlier (1897) identification of *cervinus* was also erroneous.

Our series from Roseberth and near by stands out distinctly from all the other small-sized members of the genus examined by me, by reason of the fact that its upper incisor teeth are shallowly grooved. Such grooving is

not to be seen in any other species before me. This made me suspect that the incisors of the type of *cervinus* might be similarly grooved, and Mr. Morrison-Scott, to whom I owe many favors of cooperation, has since confirmed the presence of a broad shallow groove on the incisors of the type specimen of *cervinus*. In addition the length of the ears from the crown in all but one juvenal varies from 28 to 38 mm.

Notomys fuscus (Jones)

Ascopharynx fuscus JONES, 1925, Rec. South Australian Mus., vol. 3, p. 3.

TYPE: None designated; measurements of four specimens, which may possibly be co-types, were given without indication of specimen numbers.

MATERIAL: Basedow Range (M.C.Z.), female without skull, one.

The color was described as "drab and isabelline light brown above. Below white; the hairs pale smoky at the bases. Gular pouch present in both sexes." Foot, $\pm$ 33 mm. Hallucal pad absent. Tail to 135 mm. Skull, basal length, 27 mm. Upper molar series, 5 mm. The author of *fuscus* made much of the absence of the basal pad of digit 1 of the foot. He compared it with "*cervinus*" Waite (not Gould), which was probably *N. alexis everardensis*.

In the skull, according to Jones, the palatal foramina do not pass the anterior edge of m^1 , and the pterygoid hamuli diverge at their tips.

In the skin, without skull, in the Museum of Comparative Zoölogy the color is rather dark gray-brown. The under parts are white to the hair bases on neck and thorax, gray-based in the ventral area. The hallucal pad appears to be absent.

Of *fuscus* Jones, Finlayson (1940) makes a brief comment based on a presumed paratype and topotype. That species, he writes, has a distinct gular pouch but no sternal patch.

The status of this form must remain an open question as far as this paper is concerned. It appears to belong close to *cervinus*.

Notomys sturti Thomas

Notomys sturti THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 537.

TYPE: B.M. No. 46.5.14.40, adult female, from Boonbarilba Range, 85 miles from Laidley's Pond, longitude 142° 30' E., latitude 32° 26' S. The specimen has been in fire; all the hair is burned off the hands, feet, and tail; the ears and fur are scorched. Back of skull missing, palate broken.

Dorsal color of type apparently light brown, ventral color white, with dark gray hair bases. Width of hind foot at base of fifth metatarsal, 4 mm.; length from heel to tip of metatarsal, 34.2 mm. Tail scales 11 per centimeter.

Skull much larger than that of any of the *Notomys* already dealt with, the nasals not passing the premaxillae anteriorly. Width of rostrum, 5 mm. Zygomatic plate with well-developed spine. Incisive foramina moderate. Incisors opisthodont.

Hitherto all *Notomys* discussed have been close relatives of *mitchellii*, *alexis*, or *cerwinus*. The present species and several that follow are thoroughly distinct.

Notomys megalotis Iredale and Troughton

Notomys macrotis THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 538. "Invalid through usage in Proc. Zool. Soc. London, 1851, p. 127, April 29, 1853" (Iredale and Troughton, 1934, p. 84).

Notomys megalotis IREDALE AND TROUGHTON, 1934, Mem. Australian Mus., vol. 6, p. 84.

TYPE: B.M. No. 44.7.9.14, adult, from Moore's River, Western Australia, collected by Gilbert, July 19, 1843. Back of skull missing.

Pelage of type moderately long, now faded to light grayish brown. Under parts dull white, with gray bases. No throat pouch (presumed to be a female). Hands and feet white; width of foot at base of fifth metatarsal, 4 mm.; length from heel to tip of metatarsals, 31 mm. Ears extremely large. Tail scales 11 per centimeter, scale hairs three scale lengths, a rather stiff pencil of hairs at tip of tail.

Skull generally much larger than that of *richardsonii* of Western Australia, and incisive foramina and mesopterygoid fossa much wider; molars also much larger. Zygomatic plate with spine. Zygomatic process of maxilla strongly broadened.

Notomys mordax Thomas

Notomys mordax THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 317.

TYPE: B.M. No. 46.4.465, adult, skull only, lacrimal bones missing, from Darling Downs, high on the dividing range at about latitude 28° S., southern Queensland, received from the Gould collection.

A moderately large form with full braincase, small interparietal, moderately narrowed rostrum (4.7 mm.), strongly developed zygomatic spine. The molar palate is slightly domed; the incisive foramina, mesopterygoid fossa, and bullae are normal in structure. There is a small anterior supplemental cusp on m¹.

Perhaps related to *sturti*. Formerly referred by Thomas to *Leporillus conditor*.

Notomys longicaudatus (Gould)

Hapalotis longicaudata GOULD, 1844, Proc. Zool. Soc. London, p. 104.

TYPE: B.M. No. 44.7.9.15, old female, Moore's River, Western Australia, collected by Gilbert.

MATERIAL: Barrow Creek, central Australia (A.M.N.H. No. 107400, female), one.

One of the largest species of the genus. Pelage of type brownish gray; under parts dull white, with gray hair bases. Hands and feet whitish, the width of the foot at the base of the fifth metatarsal, 4.6 mm.; length from heel to tip of metatarsals, 35 mm. Tail fuscous above, paler beneath, brush-tipped; the tail scales 11 per centimeter, the hairs three scale lengths.

Skull of type with full braincase; width of muzzle, 5.7 mm.; nasals exceeding premaxillae forward. Spine on zygomatic plate well developed. Incisive foramina and mesopterygoid fossa rather wide. Bullae large and close together. Molars short but broad.

Brazenor (1934) reports a large series from central Australia, including some from Barrow Creek. He states of the neck gland that there is "an oval gland with raised margin" in the male only.

The specimen in the American Museum of Natural History is an old female with well-worn teeth. The interparietal is characteristically narrow, the rostrum strongly compressed and flat on top, and the lacrimals are

exceptionally prominent, more so than those of *amplus*. The bullae are very large, ± 9 by 7.5 and only ± 2 mm. apart at their closest. There is no post-palatal spine, and the posterior palatal foramina are very small. The rather broad incisive foramina pass just behind the anterior roots of m^{1-1} . The zygomatic spine is present but not prominent. In the mandible there is a prominent tubercle placed high on the articular ramus, for the insertion of the temporal muscle. The angular process ends in a small, upwardly turned hook.

Notomys amplus Brazenor

Notomys amplus BRAZENOR, 1936, Mem. Natl. Mus. Melbourne, vol. 9, p. 7.

TYPE: Melbourne, No. C. 512, adult female skinned from alcohol, from Charlotte Waters, collected by the Horn expedition.

Pelage of the type golden brown; under parts white, with gray bases. Gular pouch area with specialized hairs. Ears very large. Tail brown, with white under side, long, with bushy tip, the scale hairs of the tail about four scale lengths and lengthening towards the tip. Foot, total length, 42 mm., its breadth at the base of the fifth metatarsal, 4.7 mm.

Skull with braincase large, muzzle elongate. Zygomatic plate with anterior spine. Incisors markedly opisthodont. Coronoid process of mandible reduced. The molar rows are heavy, anteriorly convergent, and relatively close together.

ZYZOMYS THOMAS

Zyzomys THOMAS, 1909, Ann. Mag. Nat. Hist., ser. 8, vol. 3, p. 372.

Laomys THOMAS, 1909, Ann. Mag. Nat. Hist., ser. 8, vol. 3, p. 373.

Small-sized Murinae that are related through dental structure with the much larger *Conilurus*, *Mesembriomys*, and *Leporillus*. The molars have the external and median cusps of each loph fused as in those genera, the internal ones separate and functional. The skull is but moderately arched, the lacrimals are large, the interorbital area is smooth and without sharp edges, the frontoparietal suture is strongly bowed posteriorly, and the interparietal is unnarrowed. The zygomatic plate is unmodified, but there is notable broadening of the zygomatic process of the maxillary. The palate is elongate, extending near-

ly 1 mm. behind m^3 , and with a strong median spine; the incisive foramina are elongate and extend back to about the middle of the first loph of m^1 . The mesopterygoid fossa is narrow, unroofed (fenestrated on either side of the basisphenoid), and slightly lyrate in form. The ectopterygoid fossae are very shallow and thus resemble those of *Mus*, *Lorentzimys*, *Leggadina*, and *Notomys*. The squamosalisphenoid suture is remote from the foramen ovale and the alisphenoid canal. A deep sinus exists in the back of the squamosal as in *Notomys* and many other genera. The bullae are unspecialized.

The skins have normal ears and feet. The well-haired tails are capable of becoming incrassated beyond the pedunculate base as far as the middle.

TYPES: Of *Zyzomys*, *Mus argurus* Thomas. Of *Laomys*, *Laomys woodwardi* Thomas.

The probably generic identity of *Zyzomys* and *Laomys* was pointed out by Ellerman (1949, pp. 25, 35). It now appears that the characters adduced by Thomas to distinguish *Zyzomys* and *Laomys* from each other are at best subgeneric. The fat-tailed condition is probably seasonal. I have not yet seen the "*Laomys*" from Groote Eylandt collected by David Johnson.

Comparison of the measurements of our specimens collected at Rifle Creek with those of the types of *argurus* and *indutus* shows a very close agreement in every measurement made. On the other hand they emphasize the divergence of the larger (*Laomys*) *woodwardi* and *pedunculatus*. *Zyzomys* (*Laomys*) *woodwardi* differs from *indutus* in its much larger foot, longer skull, wider interparietal, much broader zygomatic plate, and longer incisive foramina. *Zyzomys* (*Laomys*) *pedunculatus* has the longest bulla of any and the narrowest intermolar palate. In other respects it is intermediate between *woodwardi* and *argurus*.

ZYZOMYS, SUBGENUS ZYZOMYS THOMAS

Zyzomys argurus (Thomas)

Mus argurus THOMAS, 1889, Ann. Mag. Nat. Hist., ser. 6, vol. 3, p. 433.

Mesembriomys argurus indutus THOMAS, 1909, Ann. Mag. Nat. Hist. ser. 8, vol. 3, p. 151.

TYPES: Of *argurus*, B.M. No. 86.8.26.6, young male, in alcohol, from "South Australia," purchased from Gerrard, a dealer. Of

indutus, B.M. No. 9.4.23.3, adult male, from Parry's Creek, east Kimberley, north Western Australia, 20 feet, collected by J. P. Rogers, August 13, 1908. "Trapped in a rocky gully."

MATERIAL: A male topotype of *indutus* (Perth, No. 9595), one; Rifle Creek, north-western Queensland, three; Shipton's Flat, 30 miles south of Cooktown (in alcohol, skull cleaned), one.

Pelage of type of *argurus* rather coarse or slightly spinous. It is not clear whether or not the white ventral pelage has gray bases. Ears moderately rounded, not large. Foot slender, its width at the base of the fifth metatarsal, 4 mm.

Skull moderately arched; nasals surpassing premaxillae; interparietal of moderate size. Zygomatic plate and incisive foramina moderate, but mesopterygoid fossa narrow. The intermolar palate wide, a well-defined post-palatal spine. Bullae of moderate size. Broadening of the zygomatic process of the maxilla slight. Coronoid process of mandible small.

Incisors opisthodont. The first upper molar long and narrow, with large anterior root. The outer rows of cusps in all three upper molars obsolete or amalgamated with the cusps of the median row as in *Mesembriomys*, *Conilurus*, and *Notomys*. (See, Thomas, 1889, *tom. cit.*, for excellent figure.)

In the type of *indutus* the pelage is brown, with a slight mixture of fuscous, the hairs slightly flattened and channeled. Under parts white to the hair bases. Hands and feet white; ears not large. Width of hind foot at fifth metatarsal, 3.3 mm. Tail dark above, white beneath, the tail scales 12 per centimeter, the hairs three or four scale lengths, a tendency towards development of a brush at the end of the tail.

Skull longer and relatively narrower than that of the type of *argurus*; the maxillary root of the zygoma even less broadened; the incisive foramina longer and parallel-sided; the post-palatal spine less pronounced; and the mesopterygoid fossa wider.

The Perth specimen has the tail long, tapered, and hairy, the under parts faintly gray-based. The skull is rather flat, and there is a pronounced post-palatal spine.

It is easy to understand how a *Zyzomys* that probably came from the northern part of

Australia could be labeled "South Australia." Until 1909 South Australia extended all the way north to the Gulf of Carpentaria and Arnhemland. Only after 1909 was the Northern Territory of Australia officially separated at a line corresponding with latitude 26° S.

Of the three *argurus* taken by me at Rifle Creek Dam, one was collected at the foot of cliffs above the dam among rocks and spinifex, one in a mat of low shrub at the edge of a gully, the third, the only female, in the caretaker's kitchen. Mammary formula of this specimen, 0-2=4. In all three the white ventral hairs have distinct gray bases. The rings of the rather large scales occur 10 to a centimeter; the scale hairs are about three scale lengths. The single specimen from Shipton's Flat extends the range well into the foot of the Cape York Peninsula. It was trapped with bacon bait 300 yards north of the Roberts house at Shipton's Flat.

I am not wholly satisfied with the synonymizing of *indutus* with *argurus*, though I have followed Ellerman in this respect. The lack of gray bases in the white hairs of the ventral surface in *indutus* needs explanation. The geographical remoteness of the Kimberley Division from Cloncurry, near which is Rifle Creek, is also suggestive.

ZYZOMYS, SUBGENUS LAOMYS THOMAS

Zyzomys (Laomys) pedunculatus (Waite)

Conilurus pedunculatus WAITE, 1896, Report on . . . the Horn scientific expedition to central Australia, pt. 2, Zoology, Muridae, p. 395; and var. *brachyotis* WAITE, 1896, *op. cit.*, p. 397.

COTYPES: Sydney, a skin with skull inside; B.M. No. 97.1.8.5, young female, body in alcohol, skull cleaned, from Alice Springs, central Australia, collected by W. A. Horn.

MATERIAL: B.M. No. 97.1.8.4, adult male, in alcohol, which is probably another cotype.

Pelage of the cotype in the British Museum rather soft, but with few guard hairs and spines. Dorsal color brownish gray; ventral color white, with gray bases to the hairs. Ears rather small, rounded. Width of hind foot, at base of fifth metatarsal, 4.8 mm. Base of tail unfattened for a length of 5 mm., next 8 mm. incrassated. Tail proportionately shorter than in *argurus*. Hairs of tail scales about six scale lengths. In the second British Museum spec-

imen the width of the hind foot, as above, is 5.8 mm.; the incrassated part of the tail, 11 mm. There is a slight terminal hair pencil.

The skull, though a good deal smaller than that of *woodwardi*, is larger than that of *argurus*. The frontal region is nearly flat, the braincase less full, the interparietal longer and narrower, and the zygomatic plate much narrower than in *woodwardi*. The nasals extend beyond the premaxillae. Bullae larger than in *woodwardi*. The character of the teeth is essentially the same, though the tooth row is shorter.

This species requires comparison with *argurus* rather than with *woodwardi*. It is larger than *argurus* and its foot is 5 mm. longer, but it agrees with our material in having gray-based ventral hair. The skull is generally larger; the incisive foramina are much longer (6.7 to 7.2 mm., compared with 5.5 to 6.0); the molar tooth row is a full millimeter longer; and the molars are markedly wider.

Finlayson (1941) has reexamined Waite's series of *pedunculatus* and *brachyotis* and has amplified the old description. As Ellerman did, he finds the incrassation of the tail a character of uncertain value.

Zyzomys (Laomys) woodwardi (Thomas)

Laomys woodwardi THOMAS, 1909, Ann. Mag. Nat. Hist., ser. 8, vol. 3, p. 373.

TYPE: B.M. No. 9.2.16.3, adult female, from 5 miles west of Trigonometrical Station H.J.9, east Kimberley, north Western Australia, 100 feet, collected by J. P. Rogers, October 9, 1908.

Pelage of type rather bristly, its dorsal color mixed buff and a little blackish. Under parts white to the hair roots. Hands and feet white. Ears of moderate length. Width of hind foot at base of fifth metatarsal, 5.1 mm. Tail dark above, white beneath. Tail scales 11 per centimeter, the scale hairs above six scale lengths. Mammary formula, 0-2=4.

Skull well arched, and the occiput far exceeding the condyles. Interorbital region narrow. Front of nasals level with premaxillae. Interparietal wide and short. Maxillary root of zygoma broadened, as in *Conilurus albipes*. Incisive foramina narrow, their sides parallel, their ends rounded. Zygomatic plate moderate. Mesopterygoid fossa moderately broad.

Bullae quite small. Coronoid process of mandible better developed than in *Conilurus* and *Leporillus*.

Incisors opisthodont. Upper molars, as in most of the Australian murines, not functionally interlocking as in *Rattus*, which is partly owing to the absence of the external row of cusps as in *Mesembriomys*, *Notomys*, and *Leporillus*.

There can be no doubt as to the marked difference of this species from the other species. Its distinctiveness caused Thomas to separate it as the type of the genus *Laomys*.

MESEMBRIOMYS PALMER

Mesembriomys PALMER, 1906, Proc. Biol. Soc. Washington, vol. 19, p. 97.

Ammomys THOMAS, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 83 (preoccupied).

Very large, arboreal rats of northern Australia, having the tail longer than the head and body, clad with long scale hairs arranged three per scale, terminally white, with a pencil of white hairs. Outer surface of ears quite densely hairy. Mammary formula, 0-2=4.

Skull heavily built, with more or less arching fronto-nasal region, the rostrum long and wide, the interorbital region rather broad; the parietals and braincase narrow. Mastoid region narrow. The nasals exceed the premaxilla in front. Zygomatic plate very wide. Palate elongate, somewhat narrowed, with pronounced, sharp-edged, antemolar ridges; incisive foramina of moderate length and width with only the anterior third contained in the premaxillae; posterior palatal foramina 2.4 mm. long. Bullae small, shorter than the molar tooth row. Coronoid process of mandible much reduced; dental ramus very deep. Incisors heavy, opisthodont. Molars with the external cusps of each loph completely fused with the median one to form a main longitudinal series of cusps. The cusps of the lingual row remain subsidiary to the large compound cusps. In effect, then, *Mesembriomys* has only two rows of cusps. The first molar shows a well-developed accessory cuspule anterior to the first loph, common in such genera as *Leggadina* and *Notomys*. The distance apart of the molar tooth rows in the palate is approximately twice the width of m^1 . In the lower jaw the two-row pattern of cusps common in *Rattus* is retained nearly unaltered.

Only the external accessory cusps of *Rattus* are absent.

The genus was briefly discussed by Thomas (1909) and distinguished from *Zyzomys* and *Laomys*.

Only two distinct species of *Mesembriomys* are known: *gouldii* and *macrurus*. They are distinguished externally by the generally yellowish gray color, with black guard hairs of *gouldii*, and rufous head and dorsum of *macrurus*. The skull of *macrurus* is perhaps the less specialized, as the frontal area is less expanded, though the pterygoid fossa is narrower.

TYPE: *Mus hirsutus* Gould (= *Hapalotis gouldii* Gray).

***Mesembriomys gouldii* (Gray)**

A yellowish gray species, with long, black, guard hairs, and skull markedly arched at the naso-frontal suture. The incisive foramina longer than the molar series, the bulla shorter. The width of the zygomatic plate is so great that it virtually equals the length of m^1-3 .

Three races have been separated and, pending data pointing to their union, are so retained in this paper. The races are typical *gouldii* from Northern Territory, *melvillensis* from Melville Island, and *rattooides* from the Cape York Peninsula as far south as the Atherton Tableland.

***Mesembriomys gouldii gouldii* (Gray)**

Mus hirsutus GOULD, 1842, Proc. Zool. Soc. London, p. 12 (preoccupied).

Hapalotis gouldii GRAY, 1843, List of the specimens of Mammalia in . . . the British Museum, p. 116.

TYPE: B.M. No. 42.5.26.18, young male, probably a caged animal, collected by Gilbert. Port Essington is written on the label in a handwriting different from that of the other data; Iredale and Troughton give Port Essington. The type comprises a skin, with the hands and feet missing, and a mounted skeleton.

MATERIAL: East Alligator River, adult female (Melbourne, No. 13149); Hermit Hill, adult female (B.M. No. 97.4.12.5), collected by Dahl, August 9, 1894; South Alligator River, adult male (Tring), collected May 20, 1903.

The dorsal pelage of the type is yellowish buff, with numerous black guard hairs, the

ventral pelage yellowish buff, with gray at the bases of the hairs. Hand and feet missing (apparently they were black). Tail black, with terminal 60 mm. brownish yellow, possibly owing to discoloration. Tail scales seven per centimeter, the hairs four to five scale lengths, three to each scale, becoming much longer towards the penciled tip of the tail.

In the mounted skeleton, the sutures of the skull are still somewhat open. The condyles exceed the supraoccipital posteriorly; interparietal very narrow; zygomatic plate broad and thrown forward a little more than in *rattooides* and much more so than in *melvillensis*. The incisors have passed one another, the upper teeth having grown back into the sides of the maxillae. Molars little worn.

In B.M. No. 97.4.12.5 the terminal part (90 mm.) of the tail is white.

Dahl (1897) gave a brief description of the behavior of those animals in Arnhemland.

***Mesembriomys gouldii melvillensis* Hayman**

Mesembriomys hirsutus melvillensis HAYMAN, 1936, Ann. Mag. Nat. Hist., ser. 10, vol. 17, p. 366.

TYPE: B.M. No. 35.11.30.1, young male, from Melville Island, Northern Territory, received from the Zoological Society of London, November, 1935.

The type differs little from the other races. The white tip of the tail occupies only 40 mm. In the skull the frontal region is well inflated and abruptly arched. The zygomatic plate is sloping, and the bullae are smaller than in either *gouldii* or *rattooides*.

***Mesembriomys gouldii rattoides* Thomas**

Mesembriomys hirsutus rattoides THOMAS, 1924, Ann. Mag. Nat. Hist., ser. 9, vol. 17, p. 296.

TYPE: B.M. No. 1.3.4.1, adult female, from [near] Cooktown, north Queensland, collected July 26, 1899, by H. C. Robinson.

MATERIAL: Adult female (Tring), collected at Cooktown, August 14, 1899; a young specimen of unknown sex (Cairns, No. 806) from between Atherton and Tolga; Port Stewart (A.M.N.H.), three; Brown's Creek, Pascoe River (A.M.N.H.), one.

The color of the type is now straw yellow darkened with gray and overspread by long, black, guard hairs. The under parts are yellowish, the hair bases light gray. Hands

and feet black, the hairs bordering the claws of the fingers (not of the toes) white. Width of foot at base of fifth metatarsal, 11.5 mm. Tail long, the scales seven per centimeter, the scale hairs long, about five scale lengths. The terminal 80 mm. or more of the tail buffy white. Mammary formula, 0-2=4.

Probably owing to the condition of pelage and molt the specimens from Port Stewart, caught in September, have lost most of their long guard hairs and look very brown: whereas in the one from Brown's Creek, 100 miles farther north, caught in July, the pelage appears fresh and unworn and the yellowish under fur of the back is concealed.

Mesembriomys macrurus (Peters)

Hapalotis macrurus PETERS, 1876, Monatsber. K. Preussischen Akad. Wiss., Berlin, p. 355.

Hapalotis boweri RAMSAY, 1877, Proc. Linnean Soc. New South Wales, ser. 2, vol. 1, p. 1153.

TYPES: Of *macrurus*, not seen. Of *boweri*, Sydney, No. M.1350, adult male, from north-west Australia. The type locality of *macrurus* (*vide* Iredale and Troughton, 1934) is Mermaid Strait, near Roeburne, Western Australia.

MATERIAL: Several at British Museum from Nellie Creek, near South Alligator River, collected by J. T. Tunney, February, 1903.

Crown of the head and the dorsal area generally a rather bright rufous. Sides of the face and body gray. Under parts creamy white to the roots of the hairs. Hands and feet white. Width of the foot at the base of the fifth metatarsal, 9 mm. Basal one-fifth of the tail gray, the terminal four-fifths white. Scale hairs about three scale lengths. Scale rings about seven per centimeter. Tip of the tail heavily penciled with hair.

Skull somewhat smaller and more lightly built than that of *gouldii*. The frontal region less expanded. Mesopterygoid fossa narrow. Bulla small.

Dahl (1897) recorded this species from near Roebuck Bay.

CONILURUS OGILBY

Conilurus OGILBY, 1838, Trans. Linnean Soc. London, p. 124.

The generic description of the "tailed rabbits," which Iredale and Troughton translate into "rabbit-rats" and Lichtenstein rather awkwardly called "the white-footed thin-

ear," was founded upon specimens without skulls. Furthermore, after inclusion in *Conilurus* of the later-described northern species *penicillatus* with *albipes*, a considerable part at least of Ogilby's generic characterization falls to the specific level; and, since the generic characters are carried to greater extremes in *albipes* than in *penicillatus*, they must be modified and softened to some degree so as to remain inclusive. This requires the recasting of Ogilby's generic description.

Size of rats large (*albipes*) to medium (*penicillatus*). Hind foot more or less lengthened, of semi-hopping type. Eyes large. Ears long, broad, in *albipes* somewhat like those of rabbits but shorter. Tail shorter than head and body (according to Lichtenstein the tail is only one-third the length of the head and body), tending to be uniform in thickness (less so in *penicillatus*), and clad with long thin hair.

TYPE: *Conilurus constructor* Ogilby (= *Hapalotis albipes* Lichtenstein).¹

The skull of *Conilurus*, based upon later-caught material, is strongly arched (Ogilby mentioned the "short, round, convex head"). The braincase and mastoid region are moderately broadened (*penicillatus*) to very ample (*albipes*). The rostrum is unshortened (*penicillatus*) or somewhat short (*albipes*). Supra-orbital ridges sharp-edged (compare *Leporillus*). The interparietal is long and much narrowed. The anteorbital notches are enlarged, and the frontal processes of the premaxillae are correspondingly narrowed. The zygomatic plate is broad and well thrown forward. In *C. albipes* but not *C. penicillatus* the maxillary process of the zygoma, anterior to the orbit, is considerably broadened. Palate long and rather narrow, its incisive foramina very long (extending to the level of the back of the first loph of m^1 in *penicillatus*, level with front of m^1 in *albipes*). Posterior palatal foramina very small (1.5 mm. or less). A large pit anterior to each hamular ridge (much smaller in *albipes*). Bullae moderately small but well inflated (less inflated in *albipes*). Roof of mesopterygoid fossa much fenestrated. Ectopterygoid fossae deep. The whole sphenoidal area fenestrated, with the foramen rotundum and optic foramen ex-

¹ This is really supposition. I have seen only Lichtenstein's publication. The type may not be in existence.

exceptionally large, as in *Notomys*. Molars heavy and broad, their lophs nearly transverse (only the first loph of m^1 bent). Fusion of the two outer cusps of each loph to form a single large cusp (with preservation of the internal cusp) can be seen in *Conilurus*, exactly as in *Mesembriomys*. Mandible less deepened than in *Mesembriomys*, the coronoid process of the mandible very small.

I can recognize only two full species in *Conilurus*, *albipes* from southern Australia and *penicillatus* from northern Australia and south New Guinea. *Conilurus albipes* is distinguished from *Conilurus penicillatus* by its greater size, its velvety pelage of rather uniform length, much wider incisive foramina (combined width, 4.2 mm., in contrast to 2 mm. in *penicillatus*), shorter, broader rostrum, narrower zygomatic plate, and the markedly thickened maxillary root of the zygoma.

Conilurus albipes (Lichtenstein)

Hapalotis albipes LICHTENSTEIN, 1829, Darstellung neuer oder wenig bekannter Säugethiere . . . des Zoologischen Museums der Universität zu Berlin, pt. 6, text of pl. 29.

Conilurus constructor OGILBY, 1838, Trans. Linnaean Soc. London, vol. 18, p. 126.

Types: Of *albipes*, probably no longer in existence; Lichtenstein had one specimen from "New Holland," brought by Dr. F. W. Sieber in 1824. Of *constructor*, B.M. No. 63.6.20.1, adult female, without skull, collected by G. Caley, New South Wales, one of Ogilby's two cotypes.

MATERIAL: B.M. No. 42.6.29.8, adult female, with skull, from "Adelaide," collected by C. D. E. Fornum.

Paraphrasing from Lichtenstein's description, *albipes* is half as large again as a rat. Tail quite short, about one-third of length of head and body. Length of head and body $10\frac{1}{2}$ inches, the tail $3\frac{1}{4}$ inches. Pelage soft, thick, very long, dark gray ("darker than that of the Brown Rat"). Ears very large ($1\frac{1}{4}$ inches long by 1 inch broad). Hands, feet, mouth, and all under parts pure white. Foot long ($2\frac{1}{4}$ inches), with "broad naked" sole and strong claws. Upper incisors reddish orange, lower incisors yellow.

From Ogilby's description, *constructor* has the pelage above ash brown with gray bases, downy, woolly, and of very uniform length.

Vibrissae long, stiff, and black. Feet and under parts white. Ears long and erect. Tail as long as head and body, gray brown above and white beneath, fringed along the sides with long silky hairs. Feet with long tarsi and toes, and small weak (?) claws, the three middle toes equal. The head and body measured 10 inches, the tail $9\frac{1}{2}$, ear $1+$ by $\frac{3}{4}$ inches "posterior extremity" $3\frac{1}{2}$ inches, with "tarsus alone" $1\frac{1}{2}$ inches.

Ogilby said the two cotypes were brought by George Caley "from Sydney" (probably far in the interior), and that Caley named them "native rabbits."

These two descriptions can be fairly well reconciled except for the shortness of the tail in Lichtenstein's animal and its "strong claws." The tail of the type of *albipes* may have been injured (the illustration is not clear in this respect), and the length of claws is subject to opinion and comparison. In *penicillatus*, though the feet are lengthened the claws are not. No known Australian rodent has such a very short tail as that described by Lichtenstein.

In my own notes on the cotype of *constructor*, I emphasized the character of the pelage: soft, dense, rather long (in contrast to *penicillatus*); and of the tail: rather thick, scarcely tapered, densely haired, uniformly grayish brown above from base to tip, beneath white.

The skull of B.M. No. 42.6.29.8, adult female, is heavily built, with full braincase (width, 19.8 mm.) and rather broad interorbital area (7. mm.). The zygomatic plate is very slightly excised in front. The maxillary process of the zygoma is unusually broadened near its junction with the zygomatic plate as in *Zygomys* and related genera. The incisive foramina extend back to the front of m^1 and are exceptionally widened (combined, 4.2 mm.). The bulla is large but rather more flattened than that of *penicillatus*. The tooth row is longer (9.5 mm.), and the molars are much heavier, than in *penicillatus*.

Ogilby believes that his species was the same as the nest-building rat described by Mitchell, but the existence of *Mus conditor* Sturt, a *Leporillus*, must be borne in mind also. According to Troughton (1948, p. 310), who quotes Gould, *Conilurus albipes* (= *constructor*) was given its specific name under a mis-

apprehension and is really arboreal and not a nest-builder. He gives the range as from Darling Downs, South Queensland, to Port Phillip, Victoria. "Now probably extinct."

***Conilurus penicillatus* (Gould)**

Medium-sized rats with coarse, thin hair, moderately long tail, tipped with a terminal pencil of hairs, the end of the tail sometimes white. Ears not so much enlarged as in *Conilurus albipes*. Feet slender, moderately elongated.

Skull strongly arched. Temporal ridges sharp, and interparietal narrow. Palatal foramina very long; their anterior one-fourth only contained by the premaxillae. Palate with large posterior pits at base of the hamular processes; bullae small, usually well rounded. Zygomatic plate broad, thrown forward. Maxillary process of zygoma not broadened as in *albipes*. The external cusps of the second loph of m^1 and the first loph of m^2 are incompletely coalesced with their respective median cusps. This is clearly visible in young specimens such as U.S.N.M. No. 141485. Coronoid process of mandible so small as to be nearly obsolete.

The geographical range of the species appears to be mainly Torresian-Arnhemland and south New Guinea, though it has yet to be reported from the Cape York Peninsula.

***Conilurus penicillatus penicillatus* (Gould)**

Mus penicillatus GOULD, 1842, Proc. Zool. Soc. London, p. 12.

TYPE: B.M. No. 42.5.26.13, adult male, from Port Essington, collected by Gilbert. "Found on seashore."

MATERIAL: Ten miles south of head of South Alligator River, May, 1903, adult females (Tring Mus.), two; same locality, August 9, 1903, collected by J. T. Tunney (B.M. No. 4.1.3.22), old male, one; same locality, June, 1903, collected by J. T. Tunney (U.S.N.M.), males, three; Genoa Museum, three; Groote Eylandt, collected by S. Hawkins, March 14, 1925, adult male (B.M. No. 26.3.11.170), one.

Present color of the type dorsally brown, becoming gray brown on the sides, with a few fuscous guard hairs. Under parts dull white, with short gray bases. Hands and feet white. Width of foot at base of fifth metatarsal, 6.4 mm. Tail body-colored at base, becoming more

fuscous distally, the tip fuscous, not white. Scales 11 per centimeter, the hairs four scale lengths.

Skull small, broken at the back. Rostral width, 5.9 mm. Zygomatic plate more sloping than in the race *hemileucurus*, incisive foramina wider, and teeth much smaller.

Study of the measurements of these animals suggests that the race of *penicillatus* from the upper parts of the South Alligator River may be larger than the type form from Port Essington and that *melibius* from Melville Island across the strait may actually equal true *penicillatus*. It would, however, require an ample series of all races to demonstrate the truth of this suggestion.

Conilurus penicillatus was collected by Dahl (1897) at Hermit Hill, south of the Daly River.

***Conilurus penicillatus hemileucurus* (Gray)**

Hapalotis hemileucurus GRAY, 1858, Proc. Zool. Soc. London, p. 243.

TYPE: B.M. No. 57.10.24.17, adult male, from the north Australia expedition, collected by J. R. Elsey. An account of the expedition was published in the Journal of the Geographic Society (1858, vol. 28). The expedition went all across north Australia, but most of the observations were made on the Victoria River, which may be taken as the type locality.

MATERIAL: A short series in the British Museum.

Color of type grayish brown dorsally, with guard hairs black. Ventral color white to the hair roots. Hands and feet white. Tail fuscous brown, with terminal 60 mm. white and a terminal pencil of white hairs. Tail scales 12 per centimeter, hairs three, about six scale lengths, their bases gray but their tips white.

Skull strongly arched; width of rostrum, 6.6 mm. Interorbital region sharp-edged; braincase rather small. Otherwise like *penicillatus*, except that the molars are larger.

***Conilurus melibius* Thomas**

Conilurus melibius THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 431.

TYPE: B.M. No. 13.6.28.36, young female, from Biro, Apsley Strait, Melville Island, Northern Territory, collected October 9, 1911, by J. P. Rogers.

Color like that of previous species, but under parts creamy white to the roots. Terminal 40 mm. of tail white. Tail finely tapered with a brush of white hairs 15 mm. in length. Tail scales 11 per centimeter, the hairs about four scale lengths. Mammary formula, 0-2=4.

Skull very strongly arched in the parietal region. Interparietal narrow (only 7.6 mm.). Zygomatic plate broad and low. Bullae, though smaller than those of *hemileucurus*, rather full.

***Conilurus penicillatus randi* Tate and Archbold**

Conilurus randi TATE AND ARCHBOLD, 1938, Amer. Mus. Novitates, no. 982, p. 1.

TYPE: A.M.N.H. No. 105636, adult female, collected by A. L. Rand, December 16, 1936, at Penzara, between Wassi Kussa and Morehead rivers, Western Division, Papua, 20 meters.

Color light grayish brown dorsally, pale gray on sides. Under parts white to the roots. Ears not large. Hands and feet white. Tip of tail missing, so it is not certain whether or not it is white. Mammae, 0-2=4.

The skull is essentially similar to that of Australian forms, though larger, with broader muzzle and nasals.

This is the only example of *Conilurus*, or indeed of any of the "rabbit-rats," yet recorded from New Guinea.

MUS LINNAEUS

Mus LINNAEUS, 1758, Systema naturae, ed. 10, p. 59.

***Mus musculus* Linnaeus**

Mus musculus LINNAEUS, 1758, Systema naturae, ed. 10, p. 62.

Mus albertisii PETERS AND DORIA, 1881, Ann. Mus. Civ. Genova, vol. 16, p. 702.

Mus albertisii from Sorong is represented by four cotypes collected by D'Albertis (Genoa, No. C.E.3474; Berlin, No. 5423). They were identified by Thomas as equal to *Mus musculus*. The only adult female has the *musculus* mammary formula of 3-2=10.

The common house mouse, *Mus musculus*, is widespread today in many parts of Australia. The genus is readily recognized by the mammary formula of the females, 3-2=10, by the notched incisor teeth, and the very large size of m_1^1 in relation to m_3^3 .

In addition to the typical form, which I

found common in southern and central Queensland at Angellala, Mirabooka, Rockhampton, and Townsville, I obtained two others: a larger, darker variety from the neighborhood of the guest house on the top of Bunya Mountains and at Russell River near Cairns, and a small race with whitish hands and feet and under parts snow white to the bases of the hairs.

Since all *Mus musculus* must have been taken to Australia by man, one is tempted to speculate on their places of origin. The white-bellied form in particular is unusual and resembles some of the races of *Mus bactrianus* of China, discussed by Allen (1940, pp. 969-983). There are three such specimens: two from Angellala and one from near Mirabooka, both places about 450 miles inland from Brisbane. Two have the ventral hairs white to the roots, one has short gray bases with longer white tips. Another white-bellied specimen from Quamby, near Cloncurry, has no skull to provide an absolute check generically. It is possible that some form of *Mus bactrianus* was brought into Australia from Asia in the days when Chinese immigrants could more readily enter Australia than they can today.

Finlayson (1939a, pp. 115-117) mentions examples of *Mus* from the Lake Eyre basin which had "pure white" ventral parts.

The genus *Mus* is inserted immediately after the "Australian genera" because it shows certain likenesses to them, notably in the post-palatal region. *Mus*, as do many of those genera, possesses a well-developed, post-squamosal sinus, the lower bordering arm of which is extremely slender and attenuate as in *Pseudomys*, *Notomys*, and others. In general it seems likely that those genera are phylogenetically closer to *Mus* than to *Rattus*. *Mus*, however, shows no sign of reduction of the labial upper molar cusps, and the enlargement of m^1 and diminution of m^3 are probably special characters.

MACRUROMYS STEIN

Macruromys STEIN, 1933, Zeitschr. f. Säugetierk., vol. 8, p. 94.

Medium- to large-sized rats, externally like *Rattus* or *Uromys* but with the normal overlapping tail scales of *Rattus* and scale hairs in three's slightly longer than a scale. Mammary formula, 0-2=4. The skull is pe-

cular in that, combined with the full braincase, long rostrum, and little-expanded zygomatics, the three molars are exceptionally small and reduced to one row of primary cusps, bunodont in shape, and one internal subsidiary row of lesser cusps. No great degree of modification of these teeth would be required to give the primitive hydromyine arrangement of cusps to be seen in *Lepotomys*.

The bullae are very small, and the palate is broad, with wide, unshortened, incisive foramina and a post-palatal spine. More than half of the incisive foramen is contained in the premaxilla. The transverse suture between the palatal bones and the maxillary palate is level with the middle of m^1 . The zygomatic plate is excavated in front as in *Hydromys*, *Notomys*, *Mastacomys*, and others. There is no "shoulder" of the plate concealing the anteorbital foramen. The squamosal descends so far below the zygomatic process that its suture with the alisphenoid margins the lateral opening of the foramen ovale. This is an unusual condition not found in *Rattus*, *Melomys*, *Uromys*, *Conilurus*, *Pseudomys*, or *Hydromys*, to take a few genera at random, though in *Notomys* a condition something like it does occur. The frontoparietal suture is so markedly arched towards the back of the skull and the large interparietal extends so far forward that the sagittal suture between the two parietals is unusually short (± 7.5 mm.). In the mandible the coronoid, articular, and angular processes are all well developed.

TYPE: *Macruromys elegans* Stein.

Most of the foregoing facts serve to stress the isolation of *Macruromys* but fail to indicate positive relationship of this genus to other murid genera. One can only say that *Macruromys* is an isolated genus related to the Murinae or to the Hydromyinae. In some respects it comes closer to the latter.

The two species *elegans* and *major* are sharply different from each other, the skull of *major* being half as large again as that of *elegans*. There are paired ridges extending forward from the front of the molar rows almost to the premaxilla, which are weakly developed in *elegans*, pronounced and sharp-edged in *major*. Most of the characters given above are common to both, a little more pronounced in the larger *major*, less pronounced in the smaller *elegans*.

Macruromys elegans Stein

Macruromys elegans STEIN, 1933, Zeitschr. f. Säugetierk., vol. 8, p. 95.

TYPE: Berlin, No. 44393, adult male, from Kunupi Mountain, Weyland Mountains, 1400 to 1800 meters, collected October 3, 1931, by G. Stein.

MATERIAL: A.M.N.H. No. 103253, female (a paratype).

Color of type fuscous brown; beneath white with gray bases. Tail dark above, white beneath, scales nine per centimeter, the tail hairs one to one and one-third scale lengths. Hind foot slender, the width at the fifth metatarsal 5.1 mm. Mammary formula in three female paratypes (Stein's Nos. 320, 386, 387), 0-2=4. The proportions of the teeth appear to be quite variable.

Macruromys major Rümmler

Macruromys major RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 105.

TYPE: B.M. No. (field, F.S.M.) 317, adult male, from Buntibasa district, Krätke Mountains, 4000 to 5000 feet, collected June 23, 1932, by F. Shaw Mayer.

MATERIAL: Six kilometers southwest of Bernhard Camp, Idenburg River, 1200 meters, four.

Dorsal pelage of type gray, the tips with a sheen; under parts dull white, with very short gray bases, scarcely perceivable in some specimens. Feet long and slender, fuscous; the hands and toes white. Claws strongly curved, scansorial. Width of foot at fifth metatarsal, 8.7 mm. Tail much longer than body, its terminal two-thirds white. Tail scales eight per centimeter, overlapping. Scale hairs three per scale, about one and one-fourth scale lengths. Mammary formula (one female), 0-2=4.

The outstanding characters of the skull apart from those of generic value are its large size and the strong development of the sharp-edged ridges extending forward from the molar tooth rows.

The range of this remarkable rat is apparently limited to the northern slopes of the central range of mountains of New Guinea, including the watersheds of the Mamberano (with the Idenburg) River, the Sepik River, the Ramu, and (beyond the Krätke Mountains) not improbably to the watersheds of streams flowing to the Huon Gulf.

MALLOMYS THOMAS

Mallomys THOMAS, 1898, *Novitates Zool.*, vol. 5, p. 1.

Dendrosminthus DE VIS, 1907, *Ann. Queensland Mus.*, vol. 7, p. 10.

A genus of "giant rats," externally resembling the genus *Hyomys* but in no way related to it. Ears small and without white basal patches. Feet heavy, scansorial. Tail about equal in length to length of head and body, its scales roughly rounded, shorter than broad, provided with three scale hairs of about a scale length. Mammæ, 1-2 = 6.

Skull with inflated prefrontal, depressed post-frontal areas. Frontoparietal suture strongly arched backward. Interparietal large. Rostrum broad at the base, tapered at the front. Lacrimals small and withdrawn into the anterior wall of the orbit. Zygomatic plate straight, tall, and broad. Palate narrowed (analogous to that of *Hyomys*), but the incisive foramina very large, broad in their posterior three-fourths, narrowing abruptly in the anterior one-fourth. Back of palate at middle of m^3 . Pterygoid fossa incompletely roofed. Ectopterygoid fossae deep. Bullae very small.

TYPES: Of *Mallomys*, *rothschildi* Thomas. Of *Dendrosminthus*, *aroensis* De Vis.

Molars enlarged (broadened), their distance apart about equal to the width of m^1 . The molar gradient not steep and m^3 not small as is normal. Their lengths: m^1 , 7.5 mm.; m^2 , 4.4; m^3 , 5.1. It will be seen that, as in *Hyomys*, m^3 is larger than m^2 . The cusp pattern is highly complex. Whereas in *Hyomys* and *Anisomys* there has been fusion of the cusps and straightening of the lophs, in *Mallomys* the cusps are intensified from the *Rattus* pattern into a series of trefoil-like structures, and the curvature of the lophs is, if anything, accentuated.

I suggested earlier (1936) that *Mallomys* might be related to the similar-sized *Crateromys* of Luzon, Philippines (the use of *Phloeomys* for *Crateromys* was of course a slip), and I still think the two genera may have much in common, including the characters of the dentition, palate, incisive foramina, and bullae. Differences of not too large an order reside in the slightly excavated zygomatic plate in *Crateromys* (a trace only in *Mallomys*) and in the narrower interorbital region of *Crateromys*.

In the same paper I put forth the suggestion that *Mus armandvillei* Jentink of Flores might also be related to *Mallomys*. I now find that any close relationship is invalidated by the large *Rattus*-like bullae of *armandvillei* and its very different temporal area. Relationship for *armandvillei* should be sought among the giant *Rattus* of Celebes.

There remains for consideration the fossil mandible of *Coryphomys bühleri* from the neolithic of Timor. Schaub (1937) showed a crown view of the three right lower molars and an exterior lateral view of the mandible. The points of difference from *Mallomys* appear in the teeth (length of tooth row in *bühleri*, 19.9 mm.). In *bühleri*, in comparison with *Mallomys*, the first loph of m_1 is complete and carries two supplementary anterior tubercles, and the posterior (median) tubercle is large and functional; the posterior median tubercle of m_2 is similarly large and functional; the posterior loph of m_3 is entire, not divided into two parts by a groove at the back. In *Mallomys* the anterior loph of m_1 is rudimentary and represented merely by a single cusp which functions with the labial row of cusps; the median posterior tubercles of m_1 and m_2 are minute; the posterior loph of m_3 is divided by a posterior groove into two cusps. The molar gradients are essentially alike. In *Crateromys* the first loph of m_1 is complete but there are no anterior supplementary tubercles.

It seems then that *Mallomys* is more specialized as regards its lower dentition than *Coryphomys*, in which m_1 is less degenerate, and m_3 somewhat less removed from the m_2 of *Rattus*; and *Mallomys* is more specialized than *Crateromys* through the degeneration of the first loph of m_1 .

Mallomys rothschildi Thomas

I have provisionally maintained the three races of *rothschildi*, the typical one from the Owen Stanley Mountains, *hercules* from the Saruwaged, and *weylandi* from the mountains of western New Guinea, as separate races. I feel greater hesitation about so doing in the case of *rothschildi* and *weylandi* than I do in *hercules* on account of the massive character of the short rostrum of the last. If one may judge from the degree of variability present in *weylandi* from just north of the Snow

Mountains, it becomes increasingly likely that it and *rothschildi* cannot be sustained, but until larger collections and material from intervening areas can be studied, merging of those races may be premature.

***Mallomys rothschildi rothschildi* Thomas**

Mallomys rothschildi THOMAS, 1898, Novitates Zool., vol. 5, p. 2.

Dendrosminihus aroaensis DE VIS, 1907, Ann. Queensland Mus., vol. 7, p. 10.

TYPES: Of *rothschildi*, B.M. No. 97.12.6.6, adult male (the skin at Tring, the skull at South Kensington), from the Owen Stanley Range between Mt. Musgrave and Mt. Scratchley, 5000 to 6000 feet. Of *aroaensis*, Brisbane, No. 2814, young adult male, from headwaters of the Aroa River, collected May 12, 1905, by A. S. Meek.

MATERIAL: A male and a female, respectively from Avera, Aroa River, February 2, 1903, and Owgarr, Angabunga River, October 29, 1904, both collected by A. S. Meek, are in the Tring Museum. The frontals of the Tring specimens are somewhat swollen, but the rostrum is not thickened as in *hercules*.

The type of *rothschildi* is colored fuscous brown, the crown slightly lighter. The guard hairs are long (60 mm.) and black. Under parts dull white to the roots. Foot width at base of fifth metatarsal, 14.5 mm. The feet very heavy and apparently of climbing type. Tail scales eight per centimeter, the terminal part white. The back of the skull is broken. The extreme thickening of the rostrum seen in *hercules* is missing. Swelling of the frontals but not of the maxillae occurs.

The type of *aroaensis* has white or white-tipped guard hairs (I believe the color of guard hairs to be individual, this is certainly the case in *weylandi*). Ventral hairs white. Terminal 240 mm. of tail white. Only the front half of the skull (the teeth almost unworn) is preserved.

***Mallomys rothschildi weylandi*
Rothschild and Dollman**

Mallomys rothschildi weylandi ROTHSCHILD AND DOLLMAN, 1933, Proc. Zool. Soc. London, p. 212.

Mallomys rothschildi argentata ROTHSCHILD AND DOLLMAN, 1933, Proc. Zool. Soc. London, p. 212.

TYPES: Of *weylandi*, Tring, F.S.M. No. 95, adult female, from Gebroeders, Weyland

Range, 7000 feet, collected by F. Shaw Mayer, July 11, 1930. Of *argentata*, B.M. No. 33.6.1.33, young female, from same locality and altitude taken July 13, 1930, by F. Shaw Mayer.

MATERIAL: Balim River, 18 kilometers north of Lake Habbema, 2200 meters, 10; 9 kilometers northeast of Lake Habbema, 2800 meters, two; Lake Habbema, 3225 meters, one; 7 kilometers northeast of Lake Habbema, 3560 meters, one; 2 kilometers east of Mt. Wilhelmina, 3800 meters, one.

The type of *weylandi* is colored dorsally dark fuscous brown, a mixture of gray wool hairs and black guard hairs, the hips and base of the tail are a rather clear brown. Under parts white to the base of the hairs. Tail with terminal 250 mm. white. Foot width at base of fifth metatarsal, 15 mm. Scales seven per centimeter, scale hairs three, very short. Skull indistinguishable from that of *rothschildi*. The type of *argentata* differs in no way from that of *weylandi* except that some of the hairs are tipped with silvery. Both sorts of skins appear in our series from the Lake Habbema area.

Rümmeler (1938, p. 45) mentions a specimen in Tring which has a pure white band rising up the sides from the white under parts almost to the middle of the back. I saw it; it is F.S.M. No. 91. In our collection from the Lake Habbema region are three specimens in which a similar white belt completely crosses the back. In one the belt is 1 inch wide; in the other two somewhat narrower. Rümmeler called the condition one of "partial albinism."

In the Lake Habbema series there are two specimens, those from the two highest stations, respectively 3560 and 3800 meters, in which the incisors are almost white instead of orange and are strongly proödont.

***Mallomys rothschildi hercules* Thomas**

Mallomys hercules THOMAS, 1912, Novitates Zool., vol. 19, p. 92.

TYPE: B.M. No. 12.1.31.1, adult male, collected by C. Keyser in the Rawlinson Mountains.

Dorsal color mixed gray and fuscous, the guard hairs black with grayish tips. Under parts white to the roots. Head and feet black. Width of foot at base of fifth metatarsal, 13.7 mm. Tail with terminal 140 mm. white. Tail scales seven per centimeter, three hairs per scale. Scales much wider than long and set

somewhat on edge (true for all races).

Skull with extremely short, massive rostrum. Both frontals and maxillaries swollen. Frontals depressed at intertemporal region. A strong temporal ridge is preceded by a deep temporal fossa. Interparietal narrow and long. Zygomatic plate rather narrow and its anterior edges very straight.

The type specimen appears to be unique.

HYOMYS THOMAS

Hyomys THOMAS, 1903, Proc. Zool. Soc. London, vol. 2, p. 198.

Giant rats with small ears, strongly clawed feet, and tail with large overlapping scales in which the three scale hairs per scale are less than one scale length. Mammary, 0-2 = 4.

The skull is extraordinarily massive, with the rostrum broad and heavy, and with pronounced temporal ridges converging with the lambdoidal crests. The palate, carrying two deep longitudinal grooves, is so greatly narrowed that the molar tooth rows are separated by a space equal to but not more than the width of m^1 ; the back of the palate is U-shaped, the base of the U level with the centers of the large m^{2-3} . There are small but sharp-edged ridges in front of each molar series, somewhat as in *Macruromys*. The incisive foramina are much reduced, both in length and combined width. There are small, well-defined, posterior palatal foramina. The squamosal-alisphenoid suture descends, as in *Macruromys*, almost to the foramen ovale. The ectopterygoid fossae are deep. The roof of the mesopterygoid fossa is almost completely closed, as in *Xenuromys* and *Macruromys*. The bullae are very small. The zygomatic plate is very broad and high. The mandible is powerful and very deep.

The molars are peculiar on account of the fusion of the cusps forming each transverse loph, the subequal size of the three teeth, and their great breadth in relation to their length. In most murids $m^1 > m^2 > m^3$, with a decided size differential. In *Hyomys* m^1 is only very slightly longer than m^3 and (most unusual) m^3 is longer than m^2 . This applies only in the upper jaw; in the lower jaw the customary series is preserved, though the gradient is very gentle (length of m_1 , 6.6 mm.; m_2 , 4.3; m_3 , 4.1).

TYPE: *Hyomys meeki* Thomas (= *Mus goliath* Milne Edwards).

Despite the few resemblances of *Hyomys* to other New Guinea genera, I can regard it only as another sharply isolated genus. The relationship presumably goes far down the murid tree to an ancestral form of which no trace has been preserved.

Hyomys goliath (Milne Edwards)

I have now studied and measured the types of the four described forms of *Hyomys* and, in addition, five specimens from the mountains of Netherlands New Guinea in the neighborhood of Lake Habbema and our two from Sevia in the Huon Peninsula.

It seems probable that there exists but one species of *Hyomys*. The tail scales are subject to great wear and, in drying, to distortion. The presence or absence of the white patch at the base of the ear is a variable character; it is usually visible. A period of continuing growth after seeming maturity has been reached is sufficient to account for the large size of the two types *goliath* and *meeki* in Papua and our specimen A.M.N.H. No. 79781 from Sevia in the mountains of the Huon Peninsula. The identity of *meeki* and *goliath* on a subspecific level is virtually certain. For the present I retain *strobilurus* (Huon area) and *dammermani* (western New Guinea) as weak races, though they will probably be merged sooner or later with *goliath*.

Hyomys goliath goliath (Milne Edwards)

Mus goliath MILNE EDWARDS, 1900, Bull. Mus. d'Hist. Nat., Paris, vol. 6, p. 165.

Hyomys meeki THOMAS, 1903, Proc. Zool. Soc. London, vol. 2, p. 198.

TYPES: Of *goliath*, Paris, No. 1066A, subadult female, collected by Manton in 1900 (no. 397) in British New Guinea. Of *meeki*, B.M. No. 3.12.1.12, adult female, collected at Avera, Aroa River, by A. S. Meek. The skull of *goliath* lacks the auditory bullae. Its skin is a mounted specimen.

It has been generally assumed that *goliath* was a member of the genus *Mallomys*. Rümmler pointed out that it might equally well have been a *Hyomys* but, corresponding with Paul Rode at Paris, decided in favor of the former genus. When I visited Paris in 1937 I was permitted to study the skin and skull. There is no question at all that it is a *Hyomys*; the characteristic dental and skull characters so

indicate conclusively. I have good photographs of the skull. The type skin of *goliath* is of characteristic *Hyomys* type. The guard hairs (length 60 mm.) are white; the body hairs brownish gray. There is a white patch behind each ear. Under parts buffy white, with gray bases. The tail scales are nine per centimeter and slightly pointed or spade-shaped. Scale hairs three per scale, one to one and one-half scale lengths.

The type of *meeki* is colored mixed gray and fuscous; the guard hairs are fuscous, some with pale gray tips. The under parts have buffy hair tips, the bases gray. Hands and feet with fuscous hairs. A patch at the base of each ear whitish. Tail scales eight per centimeter, hairs three per scale and about one scale length. The scales pointed, the points often worn. The terminal 200 mm. of the tail is white.

***Hyomys goliath dammermani* Stein**

Hyomys meeki dammermani STEIN, 1933, Zeitschr. f. Säugetierk., vol. 8, p. 95.

TYPE: Berlin, No. 44408, adult female, collected in Kunupi Mountain, Weyland Range, Netherlands New Guinea, by George Stein, October 11, 1931.

MATERIAL: Bele River, 18 kilometers north of Lake Habbema, 2200 meters, three; 9 kilometers northeast of Lake Habbema, 2700 meters, one; 2800 meters, one.

The guard hairs in the type are gray, with white subterminal bands. There is no white spot at the base of the ear. Under parts dull white; the hairs gray-based except a patch of all white hairs on the chest. Terminal two-thirds of tail white. Scales keeled and pointed. Scale hairs three per scale, one-half to one scale length.

***Hyomys goliath strobilurus* Rümmler**

Hyomys strobilurus RÜMMLER, 1933, Zeitschr. f. Säugetierk., vol. 8, p. 96.

TYPE: Berlin, No. 34356, adult female, skin only, obtained by Föster at the Sattelberg, Huon Peninsula.

MATERIAL: Sevia, Huon Peninsula, 5000 feet, two (formerly named *H. meeki*).

Guard hairs of the type mixed, some black with white tips, some white. Bases of ears not white. Feet black. Tail scales as in Rümmler's

photograph. Scale hairs three per scale, one-half to one scale length.

ANISOMYS THOMAS

Anisomys THOMAS, 1903, Proc. Zool. Soc. London, vol. 2, p. 199.

An apparently monotypic genus of large rats, having rather small ears, strong scapular feet, and the tail longer than the head and body. The scales of the tail are hexagonal to spade-shaped, the subtending hairs in three's and about one and one-half scale lengths. The mammary formula is $1-2=6$, the pectoral pair being post-axial.

The skull is rather massive, but with fairly long and slender rostrum. There is a pair of small but prominent postorbital processes placed below the only moderately developed temporal ridges. The frontoparietal suture is backwardly arched, and the interparietal is quite large. The palate is a little narrowed, somewhat arched from side to side, and provided with pronounced ante-molar ridges. The incisive foramina are very short and narrow, and the septum between them shows an inferior projection. The back of the palate lies well behind m^2-3 . The bullae are small, the ectopterygoid fossae deep, and the squamosal-alisphenoid suture does not closely approach the foramen ovale. The pterygoid fossa is almost completely roofed over. The zygomatic plate is broad and high.

The molars are very slightly reduced, the intermolar palate being about two and one-half times the width of m^1 . The lophs are completely transverse and are formed by the fusion of the cusps normally composing each loph. The gradient from m^1 to m^3 is rather slight. The same gradient appears in the lower teeth.

Anisomys is peculiar in that the lower incisors are compressed from side to side to an exceptional degree (width only 1.1 mm.), hence the name *Anisomys*. There is no corresponding compression of the upper incisors. The mandible is very deep; its angular and coronoid processes are considerably reduced.

The molar pattern of *Anisomys* betrays a degree of similarity to that of *Hyomys*, though there is no suggestion in *Anisomys* of similar enlargement of the teeth or of similar narrowing of the palate. *Anisomys* is to be considered still another isolated genus.

Anisomys imitator Thomas

Anisomys imitator THOMAS, 1903, Proc. Zool. Soc. London, vol. 2, p. 200.

TYPE: B.M. No. 3.12.1.10, adult male, from Avera, Aroa River, Papua, collected by A. S. Meek.

MATERIAL: A large series of 78 specimens from the Bele River, 2200 meters; near Lake Habbema, 2800 meters, three; mountains south of the Idenburg River at 2100 meters, one; and at 1200 meters, two; Weyland Mountains, one; Sevia, Huon Peninsula, 5000 feet, one.

Extremely like *Uromys* in external appearance; vibrissae, 110 mm.; hairs of hands and feet fuscous; terminal 240 mm. of tail of type white; scales nine per centimeter, rounded or shield-shaped, overlapping; the three scale hairs one and one-half to two scale lengths.

Apart from the indications from measurements that the strain in east New Guinea and the Huon Peninsula is very slightly larger than that in west New Guinea, I judge *A. imitator* to be almost wholly uniform throughout its range.

Its lower and upper limits appear to fall, respectively, at 3000 and 9000 feet. Within these altitudinal zones it may well be distributed throughout the New Guinea rain forest.

POGONOMYS MILNE EDWARDS

Pogonomys MILNE EDWARDS, 1877, Compt. Rendus Acad. Sci., Paris, vol. 85, p. 1081.

Chiruromys THOMAS, 1888, Proc. Zool. Soc. London, p. 237.

Highly arboreal, moderately large to rather small rats in which the tail is dorsally prehensile by means of a hairless, tactile area on the last 1 to 2 cm. of the upper (not lower) surface. Tail scales overlapping, three haired. Hands and feet short and broad, of scandent type. Mammary formula, 1-2=6.

Skull (not described by Milne Edwards) broad, with short, broad rostrum, narrow interorbital region, and full braincase, moderately to widely flaring zygomatics, short, broad interparietal. The lacrimals are large and raised above the levels of the frontals. The zygomatic plate, though narrow, is tall, and its front margin is not excised. The palate is moderately narrow, and the incisive foramina are

short and narrow. There are well-developed posterior palatal foramina about as long as m^2 . The bullae are rather small but well rounded. The pterygoid region is much as in *Rattus*.

The individual molars are short and broad, with a very regular, trefoil-like, cusp pattern. The cusps are individual and distinct, and the lophs are bent, not transverse. There is a rather sharp molar gradient.

TYPES: Of *Pogonomys*, *Mus macrourus* Milne Edwards. Of *Chiruromys*, *Chiruromys forbesi* Thomas.

The classification of the species within the genus I suggested before (1936, pp. 617-620) seems still to hold, though the separation of *Pogonomys* into the two subgenera *Pogonomys* and *Chiruromys*, suggested also by Rümmler (1938), becomes less satisfactory with the discovery of the new species *kagi*. *Pogonomys kagi* combines to some extent the characters of the two subgenera. It has the slit-like incisive foramina and small tooth row of *Chiruromys* combined with the low, only moderately shortened rostrum of *Pogonomys*. It can be placed with *Chiruromys* but should be considered the least specialized of the species in that group.

The external affinities of the genus are not easily determined. I compared (1936, fig. 28) the dental pattern of the molars of various species of *Pogonomys* with that of *Hapalomys* and *Lenomys*. The cusp association of *Pogonomys* is essentially similar to that of *Hapalomys*, though the almost mathematical regularity of the latter is lacking in *Pogonomys*. *Hapalomys* is one of the Indo-Malayan tree-mice (*Vandeleuria*, *Piichecheir*, *Chiromyscus*, and *Chiropodomys*) in which the hallux is modified into a more or less thumb-like and opposable great toe provided with a nail instead of a claw. The hallux of *Pogonomys*, though slightly opposable, has a fully developed claw. The dorsal prehension of the tail is not known in any of the above-mentioned genera but reappears in the comparatively unrelated *Pogonomelomys*. For the present, I think, *Pogonomys* should be treated as a very distant relative of the tree-mice.

Pogonomys sylvestris Thomas

Pogonomys sylvestris THOMAS, 1920, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 534.

TYPE: B.M. No. 11.10.13.6, old male, from

Rawlinson Mountains at 1500 meters, collected June-July, 1911, by a Rothschild collector.

Dorsal pelage of type long and soft, somewhat more rufous than *lepidus* (probably oxidized); under parts dirty white, with gray hair bases. This is the only species of *Pogonomys* in which the hairs of the under parts have gray bases. Tail scales Ω -shaped, 15 per centimeter, hairs two to two and one-half scale lengths. The color in fresh-caught specimens is dark gray with almost no brown. The skull, as I pointed out in 1936, is the least specialized of all the species.

MATERIAL: A large series of 64 from Bele River, 18 kilometers north of Lake Habbema, at 2200 meters; two from 9 kilometers northeast of Lake Habbema, at 2700 to 2800 meters; three from Sevia, Huon Peninsula, 5000 feet.

Pogonomys sylvestris is the least specialized of the known species of *Pogonomys*. Its zygomatics are relatively unexpanded, its nasals relatively unshortened. The discovery of the species in abundance in the Lake Habbema region provides a substantial addition to the distributional picture. There were previously several records from the Huon Mountains, its type area, and Rümmler (1938, p. 68) mentioned one from the Arfak Mountains, 2000 meters, and one from Owgarra, Angabunga River.

Pogonomys macrourus Milne Edwards

Pogonomys macrourus MILNE EDWARDS, 1877, Compt. Rendus Acad. Sci., Paris, vol. 85, p. 1081.

Pogonomys lepidus THOMAS, 1897, Ann. Mus. Civ. Genova, ser. 2, vol. 18, p. 614.

Pogonomys lepidus huon TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 6.

Pogonomys lepidus derimapa TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 6.

TYPES: Of *macrourus*, Paris, No. (1473) 1104, 1877, adult, sex uncertain, from Amberbaki (Jentink, 1906), Arfak Mountains [on Paris label], collected by Laglaize. Of *lepidus*, B.M. No. 97.8.7.51, adult male, from Haveri, Astrolabe Range, 700 meters, collected by Loria, August-November, 1893. Of *huon*, A.M.N.H. No. 79763, male, from Sevia, Huon Peninsula, collected March 20, 1929, by R. N. Beck. Of *derimapa*, A.M.N.H. No. 101963, adult female, from Mt. Derimapa, Gebroeders Mountains, 1600 meters, col-

lected August 16, 1930, by F. Shaw Mayer.

Since writing on this species (Tate, 1936) I have had the opportunity of studying both the skin and the skull of the type of *macrourus*. The skull was found still in the flesh and attached to the trunk in alcohol. It was cleaned for me to work upon in 1937.

The skin is mounted. Related to *lepidus*, it is now dull brownish gray, the hands and feet grayer; the under parts are white to the roots. Tail scales broader than long, somewhat rounded, 18 per centimeter, the three scale hairs one-half to one scale length.

The skull has the muzzle moderately long; the zygomatics moderately broadened in front but broadest behind; incisive foramina short; nasals exceeding the premaxillae; incisors slightly opisthodont; zygomatic plate nearly vertical and scarcely thrown forward; condyles not exceeding the supraoccipital; back of palate level with back of m^3 ; mesopterygoid fossa rather narrow.

Examination of this type has supported my (1936) supposition and Rümmler's (1938) that *macrourus* would prove to be conspecific with *lepidus*. The specimen is doubly important as it fixes the identity of both the genotype and the genus itself. The dorsal color of the type of *lepidus* is reddish brown; under parts pure white. Hands and feet white. Ears rounded. Tail scales 13 per centimeter, scale hairs three, most about three-fourths of one scale length. Vibrissae, 50 mm.

The skull is almost exactly as in *macrourus*.

The types of *huon* and *derimapa* were segregated on the apparently greater degree of shortening of the incisive foramina and the greater size of the teeth of *huon*. I am now doubtful that these differences hold.

MATERIAL: The type of *macrourus* from Amberbaki; specimens representing *derimapa* from the Weyland Mountains, three; Hollandia, four; Cyclops Mountains, one; Bernhard Camp, Idenburg River, 850 meters, one; upper Sepik Valley, 4900 feet, two; Sevia, Cromwell Range, Huon Peninsula, 5000 feet, representing *huon*, three; Matsika, Central Division, Papua, 950 meters, 13; Sogeri, Astrolabe Range, 1500 feet, two; Baruari, Astrolabe Range, 1700 feet, one.

It should be noted that Rümmler (1938) lists a specimen in London from Arfak, which is a virtual topotype of *macrourus*. In addition

to a number of other Papuan localities he gives Bitokari, New Britain, and Japan Island.

There is a series of six topotypes from Haveri in the Genoa Museum; and from Gerekanumu, Astrolabe Mountains, four, in addition to the series of five from the Huon Peninsula.

Pogonomys macrourus is distinguished from other species by its warm, grayish cinnamon dorsal coloring and from *P. sylvestris* by its snow-white under parts (the latter common to other species); the fact that the tail is rather finely scaled (13 to 14 per centimeter); the small skull (compared with *mollipilosus*), relatively broad incisive foramina (contrasting with the various species of the *Chiruromys* group), and short tooth row (± 5.0 mm.).

It is now apparent that the species *macrourus* is distributed almost throughout forested New Guinea, Japan, and New Britain at altitudes between a little above sea level and 5000 feet. We failed, however, to find it in the Fly River area.

Pogonomys mollipilosus Peters and Doria

Pogonomys mollipilosus PETERS AND DORIA, 1881, Ann. Mus. Civ. Genova, vol. 16, p. 698.

Pogonomys loriae THOMAS, 1897, Ann. Mus. Civ. Genova, ser. 2, vol. 18, p. 613.

Pogonomys dryas THOMAS, 1904, Novitates Zool., vol. 11, p. 600.

TYPES: Of *mollipilosus*, Genoa, No. C.E. 3491, young adult male, in alcohol, skull extracted, collected by D'Albertis at Katau, lower Fly River. Of *loriae*, B.M. No. 97.8.7.47, adult male, and Genoa, No. C.E.3492, adult female, both skinned from alcohol (July, 1897), collected by Loria, November, 1893, at Haveri, Astrolabe Range. Of *dryas*, B.M. No. 4.4.10.6, adult female in alcohol, from Dinawa, Owen Stanley Range, collected by A. E. Pratt.

MATERIAL: Haveri (Genoa, No. C.E. 32590), one; Moroka (Genoa, no number), one; Matsika, St. Joseph River, five; Mt. Derimapa, Gebroeders, Weyland Range, 5000 feet, one; junction of Palmer River with Fly River, four; Oroville Camp, upper Fly River, one.

Dorsal color of type of *mollipilosus* reddish brown, ventral color creamy white. Tail prehensile dorsally, the tail scales broader than long, 14 per centimeter, scale hairs three

per scale, three-fourths of one scale length basally, distally one and one-half times one scale length.

Skull with tooth rows subparallel; m^{1-1} twice as far apart as their width; m^1 with four external, three median, and three internal tubercles; m^3 with one incipient external, two median, and three internal tubercles.

The present color of the type of *loriae* is dark gray, with a brownish cast; the under parts are self-colored creamy white; hands and feet white. Vibrissae, 85 mm. Tail scales 10 per centimeter, the scale hairs three; median one three-fourths of one scale length, terminal one one and one-half scale lengths. The female is reddish brown above, self-colored buffy white beneath; tail scales 11 per centimeter, slightly broader than long; hairs as in the male. In the skulls the proportion of m^{1-3} to the palatal length is less than in *mollipilosus*, but then the last is a younger animal. Small paired palatal swellings between m^3 - m^3 . Fourth outer tubercle on m^1 weakly present on both co-types.

A male topotype, Genoa, No. C.E.3492, is still in alcohol but the skull is cleaned. Palatal prominences are equally distinct. A very small fourth external tubercle on m^3 .

Color of type of *dryas* gray, with touch of brown; under parts pure white; ears well rounded; hands and feet white. Tail scales wider than long, 11 per centimeter, scale hairs three, three-fourths of a scale length. Skull with incisors proödont; teeth longer than in *vates* or *lamia*. This is apparently fully synonymous with *loriae*.

Rümmeler (1938) synonymized *loriae* and *dryas* with *mollipilosus*. I cannot dispute the identity of *dryas* with *loriae*, but I still have some doubt of the absolute identity of these with *mollipilosus*. At least, no material I have yet seen of the former is so large as, or has the length of rostrum of, our two female *mollipilosus* of the upper Fly River. Also all our *Pogonomys loriae* (= *dryas*) have much of the tail white-spotted or white-blotched, no spots appearing in our Fly River *mollipilosus*. There is a trace of white on the tail of the specimen from the Gebroeders highlands. Thus, it seems possible that true *mollipilosus* is a lowland race, while *loriae* extends along the mountains from east to west at levels between 2000 and 5000 feet. Still, I would not advocate more than subspecific distinction and that

only uncertainly. For the present they are treated as one.

Pogonomys mollipilosus in the broad sense is a large, long-tailed species colored either clear gray or gray just touched with brown dorsally, and ventrally pure white to the roots of the hairs. The tail is usually partly white; the scales, 10 per centimeter, are much longer than those of *macrourus* and about equal to those of the otherwise much smaller *P. lamia*. The skull is distinguished at once from that of the equally large *forbesi* of the *Chiruromys* group by the much longer rostrum and unnarrowed incisive foramina. The molar tooth row has a length of ± 6.5 mm., compared with ± 5.0 mm. in *P. macrourus*. The young, which often somewhat resemble other species, can be distinguished easily by their large teeth.

The remaining species of *Pogonomys* belong in the more specialized *Chiruromys* group, typified by *P. forbesi*. Their characters include very short rostrum; sharply expanded zygomata, especially at the maxillary roots; more or less expanded frontals; slit-like instead of broad incisive foramina. Both large and small species are included, *forbesi* being one of the largest.

Pogonomys forbesi (Thomas)

Chiruromys forbesi THOMAS, 1888, Proc. Zool. Soc. London, p. 239.

Pogonomys pulcher THOMAS, 1895, Novitates Zool., vol. 2, p. 164.

Pogonomys forbesi vulturinus THOMAS, 1920, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 535.

Pogonomys forbesi mambatus THOMAS, 1920, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 536.

Pogonomys satisfactus TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 7.

Pogonomys pulcher major TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 8.

TYPES: Of *forbesi*, B.M. No. 88.3.16.2, adult female, from Sogeri, Astrolabe Range, 1500 feet, collected by Forbes. Of *pulcher*, B.M. No. 95.5.8.5, adult male, from Fergusson Island, D'Entrecasteaux Islands, collected by A. S. Meek. Of *vulturinus*, B.M. No. 97.8.7.64, adult female, from Bara-bara, Milne Bay, collected by Loria. Of *mambatus*, B.M. No. 7.2.1.10, adult male, from Mamberé River, 300 meters, collected by C. A. W. Monckton, July 1, 1906. Of *satisfactus*, A.M.N.H. No. 79828, adult male in alcohol,¹

from Goodenough Island, D'Entrecasteaux group, collected by R. H. Beck, November 18, 1924. Of *major*, A.M.N.H. No. 79831, adult female in alcohol,¹ from Goodenough Island, collected by R. H. Beck, November 18, 1924.

MATERIAL: Representing *forbesi*: B.M. No. 88.3.16.3, a young male paratype. Representing *pulcher*, *major*, and *satisfactus*, one adult and one juvenal male. Representing *vulturinus*, Genoa, Nos. C.E.3258 and C.E.3521, topotypes, collected by Loria in 1890; and at Tring Museum, "inland from Holmicote Bay, near Buna, collected by Rohn, two skulls in skins. Rümmler (1938, p. 73) cited additional specimens: Sogeri, three; Milne Bay, five; Buna area, four; Kokoda, 1000 feet, three; Tamata, Mamberé River area, six; Ioma, longitude 147° 52' E., latitude 8° 20' S., north of Buna, five; Fergusson Island, four; Bou, Milne Bay, eastern Papua, four; Sattelberg, one.

The type of *forbesi* is grayish brown above, white beneath to the roots of the hairs; hands and feet white, the width of the foot at the fifth metatarsal, 6 mm. Ears broadly rounded (10 mm. wide). Tail elongate, the scales eight per centimeter, scale hairs three, two-thirds of a scale length. Vibrissae, 85 mm. in length. Mammary, 1-2 = 6.

In the type of *vulturinus* there is a distinct pale area between the eye and the ear on each side. The type of *mambatus* lacks the postocular patches and is slightly more reddish than *vulturinus*. It is evident now that there is considerable variation in this species, since no fewer than three forms could be named from the D'Entrecasteaux Islands.

The distribution of *forbesi* now seems to include the whole of the north side of New Guinea as far west as the Mamberano River and the south side between Milne Bay and the Astrolabe Mountains. The altitudes given indicate a vertical range from a very few hundred feet to possibly 2000 feet.

The remaining species of the *Chiruromys* group, *lamia*, *kagi*, and *vates*, are smaller. I have no doubt of the identity of our material from Rigo with that from Ighiberei (*P. lamia*). The places are only a few miles apart, and the specimens match very closely. The animal from the Fly River (A.M.N.H. No. 105360, female) has the coarse tail scales and greatly narrowed incisive foramina of the subgenus

¹ Made into study skins in 1951.

Chiruromys. Its color is brownish gray above, and beneath it is whiter rather than buffy white. Its teeth are far too small for it to be related to *mollipilosus*, and it is here referred to *vates*.

***Pogonomys lamia* Thomas**

Pogonomys lamia THOMAS, 1897, Ann. Mus. Civ. Genova, vol. 38, p. 615.

COTYPE: B.M. No. 97.8.7.65, adult male, skinned from alcohol, from Ighiberei, lower Kemp Welch River, received from Genoa Museum and therefore probably collected by Loria.

MATERIAL: From Kokebagu, lower Kemp Welch River, near Rigo, nine; north shore of lower Fly River opposite Sturt Island, sea level, one; "British New Guinea" (C.N.H.M.), three. Rümmler adds Mt. Gayata, which is in the general Astrolabe area.

Present color of type grayish brown; under parts self-colored buffy white. Tail scales hexagonal, wider than long, about 13 per centimeter, scale hairs three, two scale lengths. Hands and feet white.

The skull, compared with that of *vates*, has more flaring zygomatics, larger bullae and teeth, and fuller braincase.

***Pogonomys kagi*, new species**

TYPE: A.M.N.H. No. 108458, adult male, from Kagi, south side of central range near Mt. Albert Edward, on Moresby-Kokoda track, 5000 feet, Papua, collected by G. H. H. Tate, March 11, 1937. The type is a skin and skull, the latter somewhat broken.

GENERAL CHARACTERS: A small species about equal in size to *vates* and *lamia*. Distinguished from *vates* by its much smaller tail scales—about 15 per centimeter instead of eight in *vates* (12 in *lamia*). From *lamia* it is distinguished by its much smaller foot, softer, silkier hair, white instead of buffy under parts, shorter incisive foramina, and smaller teeth.

DESCRIPTION OF TYPE: Pelage very fine and silky, colored a rather dark gray, paling on the face to ashy, and on the sides assuming a slight brownish shade. Hands and feet white. Under parts snow-white to the bases of the hairs; mouth and cheeks white. Ears fuscous, broadly rounded. Tail fuscous, the tail scales flat or slightly rugose, rounded, 15 per centimeter, scale hairs one and one-half scale lengths.

Skull less heavily built than that of *lamia*, more like the skull of *vates* and with similarly small incisive foramina. The fronto-squamosal suture dips only slightly towards the squamosal root of the zygoma, as also in *lamia*, in contrast to the marked visible sinuosity in our specimen of *vates* (?) from the Fly River. The teeth, particularly the incisors, are smaller than those of *lamia* and subequal to the teeth of *vates*.

MEASUREMENTS OF TYPE: Skin (field measurements), length of head and body, 107 mm.; tail, 141; hind foot (s.u.), 24; ear from crown, 16. Skull (laboratory measurements), total length, 29.2; condylobasal length, 27.2; basal length, 25.2; zygomatic width, 16.7; nasals, 9.0 by 3.0 (greatest); least interorbital width, 4.6; interparietal (length by width), 4.2 by 9.8; zygomatic plate, 3.2; palatal length, 4.2; incisive foramina, 4.0 by 1.4; length of posterior palatal foramina, 1.2; width of mesopterygoid fossa, 2.2; length of bulla, 4.6; width inside m^{-1} , 2.6; length of m^{-3} , 4.75; m^1 , 2.2 by 1.6; m^2 , 1.4 by 1.6; m^3 , 1.1 by 1.0.

Besides the type there are four paratypes: one male and three females, one of which showed the mammary formula 1-2=6.

These small climbing rats were reported to be gregarious and to live, several together, in knot-holes in trees.

***Pogonomys vates* Thomas**

Pogonomys vates THOMAS, 1908, Ann. Mag. Nat. Hist., ser. 8, vol. 2, p. 495.

TYPE: B.M. No. 8.10.8.7, young male, from Madeu, upper Angabunga River, 2000 to 3000 feet, collected by Stalker, June, 1908.

MATERIAL: North shore of middle Fly River, opposite Sturt Island, sea level, one.

Dorsal color of type grayish brown, becoming clear brown on sides; under parts pure white to bases of hairs. Mouth and cheek white. Vibrissae, 70 mm. Ears somewhat elongate, narrow and a little pointed. Tail scales larger, pointed, keeled, only eight per centimeter, the scales Ω -shaped, hairs three per scale, one-half to one scale length.

The skull is built like that of *forbesi* but is much smaller.

I have referred the Fly River specimen, A.M.N.H. No. 105360, female, to *vates* with considerable doubt; it agrees better with that

species than any other, and it differs from *lamia*, of which I have a number of specimens from close to the type locality.

Superficially this animal resembles my new species *kagi*. Its size is the same, though it has a strong admixture of brown in the dorsal pelage. The tail scales are large and coarse and are 10 to the centimeter (the tail of *lamia* type may have been stretched somewhat). The under parts are white as in *kagi*, and the ear is distinctly narrowed and somewhat pointed (a character of *lamia*). The outstanding feature about the skull of this specimen is the strong deviation on each side of the parieto-squamosal suture, caused by a projection of the parietal into the squamosal just above the zygomatic process. Mr. Morrison-Scott has kindly sent me a drawing made from the type of *vates*, which demonstrates a V-shaped projection from the parietal into the squamosal. Earlier study of the type of *vates* showed me that I was mistaken in 1936 in referring it to *lepidus*.

THE *Uromys* GROUP OF GENERA

This group of genera comprises *Melomys*, *Uromys* with its allies, *Xenuromys*, and *Pogonomelomys*. I discussed it in part in my earlier paper (Tate, 1936, pp. 587-589), though at that time *Pogonomelomys* and *Xenuromys* had not been recognized. The common character seen throughout the group of genera is found in the dentition, described by Ellerman (1941, p. 227) as "strictly simple . . . ; the cusps on each lamina fuse together and in no case, so far as examined, are clearly marked." Earlier I illustrated the teeth of a number of species of *Melomys* (1936, fig. 23) and one *Uromys* (*ibid.*, fig. 26).

Only *Xenuromys* and *Melomys* contain species that can be regarded as partly annectant with the assumed, somewhat *Rattus*-like ancestor of the group. Both *Uromys* and *Pogonomelomys* have diverged widely, as have most groups of *Melomys*. *Melomys albidens* and some members of the *M. levipes-cervinipes* division seem to represent the forms least removed from *Rattus*.

The reference of these rats to a *Rattus*-like ancestry is of course an assumption. We have no fossil evidence to indicate that such divergence took place or to suggest the time and place of the occurrence. There is no trace of

the *Uromys* group west of the Moluccas or north of the Talaud Islands. Nor do I think that any of the groups of *Rattus* of Malaysia can be taken to be a likely co-descendant with the *Uromys* group, not even *Rattus nativitatis* (Ellerman, 1941, p. 226), in which, though the tail scales are rather file-like, the teeth are more complex.

The group is geographically compact, and its center of evolution and dispersal appears to be the island of New Guinea. It has penetrated to the offshore islands both west and east—to the Talauds and to the Solomons. Southward it has reached Arnhemland and, by way of Cape York, the whole of the eastern coastal strip of Australia as far as northern New South Wales.

The most widespread genus is *Melomys*, the next *Uromys*. *Pogonomelomys* appears not to have entered Australia. No evidence is available to show that the *Uromys* group was ever more widely distributed than it is today.

ONE-HAIRED AND THREE-HAIRED TAIL SCALES IN THE *Uromys* GROUP OF GENERA

In most species of *Melomys* the distinction between species with one or with three hairs to each tail scale is perfectly clear. In true *M. cervinipes* and its Papuan ally *M. moncktoni* (the type) the three hairs are so long (slightly more than one scale length) as almost to retain the appearance of *Rattus*. In *M. leucogaster* each raised scale possesses a single median (distal) hair of about one-half a scale length. These represent the extremes within the genus. In *M. lutillus* three hairs are present but are often short as in *leucogaster*. It is assumed that animals with short, single scale hairs are derived from ancestors which had three unshortened scale hairs.

Several questions in regard to the molt of the scale hairs remain unsettled. What happens? Is each hair replaced individually by another? Is it possible that lateral hairs of a trio are lost before the median one, temporarily leaving a one-haired condition? The particular reason for this query is the condition to be seen in *M. platyops* of the Hollandia area and in the races of *levipes*. In occasional specimens of northern *platyops* (*M. p.*

mamberanus) specimens having some scales one-haired and others three-haired can be noted, as well as individuals having three-haired tail scales and other individuals with one-haired tail scales. Yet in the Astrolabe Mountains, near Port Moresby, *M. platyops* (one-haired) can be distinguished invariably from *M. moncktoni* (three-haired). In *M. levipes* the observed facts are on the racial level, some races having three-haired tail scales (*M. l. lanatus*, *M. l. rattoides*, and *M. l. lorentzii*), others having one-haired tail scales (*M. l. levipes* and *M. l. naso*). Pending further elucidation of the subject it is assumed in this paper that *cervinipes* (with *moncktoni*) and *platyops* are actually still diverging from each other (they are very closely related in any case), and that in some of the races of the much larger but otherwise nearly related *levipes* reduction from three to one hair per scale has recently been accomplished.

This trend towards reduction of the number of scale hairs, including modification of the forms of the tail scales, is one of the characteristics of the mosaic-tailed rats. It is almost but not quite confined to them. Ellerman (1941, p. 226) points out that *Rattus nativitatis* has a similar tail. The mosaic pattern, with but a single scale hair per scale is complete in *Uromys*, *Cyromys*, *Solomys*, and *Unicomys*, all large-sized rats allied to the smaller *Melomys*.

From the standpoint of tail characters alone the tree-, or bush-climbing *Pogonomelomys* appears to be diphyletic: the small-sized *sevia* section still has three long hairs per tail scale; the larger *mayeri-bruijnii* section one short hair to each modified scale.

XENUROMYS TATE AND ARCHBOLD

Xenuromys TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 3.

Large rats having the general appearance of *Uromys* but with the normal overlapping tail scales of *Rattus*.

The skull has molars of the *Melomys-Uromys* type, the tooth rows set widely apart in the palate. The braincase is full, the zygomata unbroadened—a combination of characters virtually the opposite of what is found in *Uromys*. The incisive foramina are broad and unshortened. The zygomatic plate is broad, its anterior edge slightly slop-

ing. The bullae are small, thus conforming to those of *Uromys* and some *Melomys*. The transverse maxillopalatal suture is level with the backs of m^{1-1} as in *Melomys levipes*.

I am inclined to place *Xenuromys* in the *Uromys* group of genera and to regard it as having diverged after the evolution of the *Uromys* dentition but before development of the specialized tail scales, somewhat as in the case of the primitive *Melomys albidens*.

TYPE: *Xenuromys guba* Tate and Archbold (= *Mus barbatus* Milne Edwards).

Xenuromys barbatus (Milne Edwards)

Mus barbatus MILNE EDWARDS, 1900, Bull. Mus. d'Hist. Nat., Paris, vol. 6, p. 167.

Xenuromys guba TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 4.

TYPES: Of *barbatus*, Paris, No. 1900-398/1066B, adult male, with skull, mandible missing, from British New Guinea, collected by Manton. Of *guba*, A.M.N.H. No. 152043, adult male, from Bernhard Camp, Idenburg River, Netherlands New Guinea, 75 meters, collected April 14, 1939, by W. B. Richardson.

The present color of the type of *barbatus* is a somewhat reddish brown, without pattern; under parts self-colored buff. Tail with terminal 130 mm. white, the scales seven to eight per centimeter, the three scale hairs about one-half a scale length. The scale rings overlap as in *Rattus*.

The skull is characterized by its very full braincase and wide mastoid region; long heavy muzzle; wide intermolar palate; short incisive foramina, slightly more than half of which are contained in the premaxillaries; narrow zygomata; wide, well-rounded, mesopterygoid fossa. The bullae are missing, and the zygomatic plates are too badly broken to be measured. First upper molar is elongate and m^3 is very short.

From the American Museum specimen (type of *guba*) I am able to add that the color of the fresh unfaded skin is gray above, without any rufous; beneath white to the roots. The ears are small, considerably smaller than those of *Uromys*. The tail has imbricated scales and very short (one-half of one scale length) scale hairs. At least half of the tail is white. The bulla is very small in terms of the tooth row ($\pm 11: \pm 24$). The zygomatic

plate is broad (7.3 mm.), and its anterior edge is nearly upright, curving without abruptness to the notch. The incisive foramina are very broad. The incisors are opisthodont.

The fact that only two specimens, both males, of this remarkable giant rat are known possibly implies that it possesses unusual habits. Its feet and tail show no structural feature to indicate whether it is particularly arboreal or fossorial, nor does the pelage suggest aquatic habits.

MELOMYS THOMAS

Melomys THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 260.

Paramelomys RÜMMLER, 1936, Zeitschr. f. Säugetierk., vol. 11, p. 248; 1938, Mitt. Zool. Mus. Berlin, vol. 23, p. 132 (proposed as a subgenus).

A genus of rather small- to medium-sized rats of the *Uromys* group of genera, *Melomys* is distinguished from *Uromys* chiefly by its much smaller size and by its generally less reduced audital bullae, though in the section of *Uromys* known as *Solomys* (Solomon Islands) the bullae are also larger. As *Melomys* is now constituted, any further distinctive characters are restricted to various of the species groups and have no wider application.

TYPES: Of *Melomys*, *Uromys rufescens* Alston. Of *Paramelomys*, *Uromys levipes* Thomas.

Considerable diversity of opinion has existed in the past regarding the scope of *Melomys*. Originally set up by Thomas in 1922 to segregate a number of small species originally placed in *Uromys*, it consisted of the genotype, *rufescens*, and some 25 other forms. It did not include *Uromys sapientis*, for which *Solomys* was then proposed.

I have studied both Rümmler's (1936, 1938) work on *Melomys* and the views expressed by Ellerman (1941, 1949) in relation to our large collection of material representing many of the species of *Melomys*. Since the publication of my brief early studies of *Melomys* (Tate, 1936), much additional material has been accumulated at the American Museum of Natural History, including excellent series of some of the species known previously from only one or two specimens.

Furthermore, the opportunity I had in 1937 to study the many types in Europe and to make notes and photographs of them has given me valuable additional tools for systematic work.

Rümmler (1938) concluded that *Solomys* and the new long-haired *Unicomys* should be included in the concept of *Melomys*. In his view, *Melomys* comprised four subgenera: *Melomys* (*sensu stricto*), with genotype *rufescens*; *Paramelomys* Rümmler, with genotype *levipes*; *Pogonomelomys* Rümmler, with genotype *bruijnii*; and *Solomys*, with *Unicomys* a synonym. Tate and Archbold (1941) promoted *Pogonomelomys* to full generic rank on account of its upwardly prehensile tail. Ellerman (1941) reviewed the status of *Melomys* generally and in part followed Rümmler's classification. Expanding earlier brief notes (1947), Ellerman (1949, pp. 40, 222) placed *Paramelomys* in synonymy and accepted (pp. 26, 86) *Pogonomelomys* as a full genus. Frechkop (1949) also followed Rümmler in placing *Solomys* in *Melomys*.

I cannot agree with Rümmler that the *Uromys*-like *Solomys* and the long-haired *Unicomys* should be placed in *Melomys*. Both, however, belong in the *Melomys-Uromys* complex of mosaic-tailed rats. In the same complex belongs *Pogonomelomys*. The complex taken as a whole is probably derived, as pointed out by Ellerman, from an early type which also gave rise to *Rattus*.

Melomys, in my opinion, with the possible exception of the white-toothed species, which are dealt with first, beyond, is divisible into two main divisions, each divided into three primary groups.

KEY TO THE DIVISIONS AND GROUPS OF *Melomys*, EXCLUDING THE SPECIES WITH WHITE INCISORS

1. Relatively primitive species with longer rostra and little modified tail scales
 *levipes-platyops-moncktoni-cervinipes* division, 2
2. Relatively specialized species with shorter rostra and strongly modified tail scales (including the genotype)
 . . . *leucogaster-rufescens-lutillus* division, 3
2. Large- to medium-sized species colored cinnamon to gray brown, the under parts white, with the roots of the hairs gray, tail white beneath, rostra reaching maximum

- lengthening *levipes* group
 Medium-sized species with large scales
 *platyops-rubex* group
 Medium-sized species having smaller scales .
 *moncktoni-cervinipes* group
 3. Large-sized species, with brownish gray pelage
 and the under parts white to the base of the
 hairs *leucogaster* group
 Medium-sized species, with brown to cinnamon
 pelage and under parts white to the roots of
 the hairs. *rufescens-stalkeri* group
 Medium- to small-sized (the smallest known
Melomys) species, with ashy brown or gray
 brown dorsal pelage, lower sides orange,
 belly hairs sometimes white-based or creamy,
 but in some wholly gray-based
 *lutillus* group

Melomys WITH WHITE INCISORS

Two species of *Melomys*, *fellowsi* and *albidens*, have the incisors white, instead of orange as in the majority of rats. This characteristic is known to occur occasionally in other rodents—for example, in *Echiorhix leucura* of the Celebes. Its significance is not known.

I had suspected close relationship in the case of *Melomys fellowsi* and *M. albidens*. To allow me to check the matter Mr. T. C. S. Morrison-Scott kindly lent me two specimens of the former. The differences can be summarized: *fellowsi* is considerably larger; its tail is longer (180:140 mm.); its tail scales are larger (12:20) per centimeter, its scale hairs less than a scale length and one per scale (in *albidens*, three scale lengths and three per scale, much as in *Rattus*). The rostrum of the skull of *fellowsi* is longer; the zygomatics expand less abruptly at the maxillary root, the braincase is less full; the bullae are smaller; the molar tooth rows are anteriorly convergent (in *albidens* divergent), and the molars are broader. One can only conclude that these two species are not only thoroughly distinct from each other but also from any member of the three large groups of *Melomys* that form the principal part of the genus.

In the case of *M. albidens* we may possibly have an example showing the transition from a *Rattus*-like ancestry to *Melomys*. The teeth have achieved the narrow, simplified pattern common to *Melomys* and its allies, but actually the tail of *M. albidens* is still almost

typically *Rattus*-like, with overlapping rings of scales and each scale subtended by three hairs of about three scale lengths. Ellerman (1941, pp. 226–227) found *Melomys* closely related to *Rattus*, and the discovery of *albidens* tends to confirm this view. *M. albidens* suggests a proto-*Melomys*. In *Melomys fellowsi* the tail is already typical of mosaic-tailed rats, and the scale hairs are reduced to one per scale. Only the white incisors and certain specific characters set it off from the *M. platyops* and *M. levipes* groups.

Melomys albidens, new species

TYPE: A.M.N.H. No. 150821, adult male, Lake Habbema, 15 miles north of Mt. Wilhelm, Netherlands New Guinea, altitude 3225 meters, collected August 14, 1938, by W. B. Richardson (field no. 4698), 1938 New Guinea expedition. The type is a skin and skull in good condition.

GENERAL CHARACTERS: A *Melomys* differing sharply from all species except *M. fellowsi* by possession of white incisor teeth. From *M. fellowsi* it is distinguished by its much smaller size, and proportionately broader zygomatics, larger bullae, shorter tooth row, and much narrower molars.

DESCRIPTION: Pelage long and soft, above and below, the dorsal color near Wood Brown (Ridgway), with the hair bases fuscous; ventrally much paler brown, the bases of the hairs also fuscous. Ears large. Hands and feet whitish. Width of foot at base of fifth metatarsal, 4.4 mm. Tail lacking the *Melomys-Uromys* characters (which, however, are developed in the simple dentition), and instead showing the overlapping scale rings of *Rattus* and scale hairs, three per scale, about three scale lengths.

Skull with full braincase and well-expanded zygomatic arches, in combination with a narrow, somewhat elongate muzzle. Interparietal wide (10 mm.). Nasals surpassed backwardly by the nasal processes of the premaxillae. Anterior part of frontals depressed. Lacrimals large, prominent. Zygomatic plate very narrow, its anterior edge vertical to the notch, which is extremely shallow. Bullae large, considerably larger than in the otherwise larger *Melomys fellowsi*. Palate extending back to middle of m^3 , and provided with a blunt, post-palatal spine.

Pterygoid fossa rather wide (2.8 mm.). Incisive foramina, which stand well in advance of the molars, only slightly shorter than the molar rows; the tooth rows in turn shorter than the bullae.

MEASUREMENTS: (Field): Head and body, 122 mm.; tail, 162; hind foot (s.u.), 26; ear from crown, 22. Skull (laboratory), condylo-basal length, 27.3; zygomatic breadth, 15.8; nasals, 10.0 by 3.5; interorbital breadth, 5.3; interparietal breadth, 12.0; breadth of braincase, 14.1; zygomatic plate, 2.3; palatal length, 13.7; incisive foramina, 5.2 by 2.1; length of bulla, 5.6; breadth of mesopterygoid fossa, 2.5; m^{1-3} , 5.3; m^1 , 2.6 by 1.7; m^2 , 1.8 by 1.5; m^3 , 1.1 by 1.2.

Melomys fellowsi Hinton

Melomys fellowsi HINTON, 1943, Ann. Mag. Nat. Hist., ser. 11, vol. 10, p. 554.

TYPE: B.M. (field no. S.M.695), male, from Baiyanka, Purari-Ramu divide, north-east New Guinea, 8000 feet, June, 1940, collected by F. Shaw Mayer.

MATERIAL: Mr. C. T. S. Morrison-Scott has kindly lent me two specimens of Shaw Mayer's original series for examination.

The tail scales are simple like those of *platyops* and are each accompanied by one hair of about a scale length. The feet are moderately broadened at the terminal parts of the metatarsals and appear to be of scanty type. There is no tactile area of skin at the end of the tail such as appears in *Pogonomelomys* and *Pogonomys*. Mammary formula, 0-2=4. The skull is narrow and elongate, as in *platyops* or *levipes*. Interparietal narrow; back of nasals level with back of nasal processes of premaxillaries. Zygomatic plate narrow, but nearly upright; the notch exceedingly shallow. Incisive foramina and bullae unreduced. Palate narrow, ending at the back level with the middle of m^{3-4} ; a post-palatal spine. Molars moderate in size, of "*Melomys*" type, the rows slightly convergent anteriorly. The ivory white fronts of the incisors, upper and lower, are a conspicuous feature of the skull.

THE *Melomys levipes-cervinipes-platyops* DIVISION

This division of *Melomys*, as previously

stated, is to be considered the more conservative or less specialized of the two divisions and in consequence the less removed from the supposed primitively *Rattus*-like ancestor of all *Melomys*. The elongate, unbroadened, terrestrial type of foot is retained. That is not to imply that these rats are poor climbers. *M. cervinipes* can climb expertly. But the shape of its foot has not yet undergone the broadening process manifested by *leucogaster* and *rufescens*. The tail has the scales but little modified; they have already lost the imbricated *Rattus*-character and acquired the "mosaic" character; but generally they remain flat, little ornamented, sculptured, or rasied (some degree of modification is found in *M. c. limicauda*). Reduction of the scale hairs from three to one per scale has begun only in a part of the division; three hairs are retained in all *cervinipes*, including true *moncktoni*, but rarely in *platyops* (with *rubex*), and in only about one-half of the races of *levipes*.

In the skull the shortening and broadening process found in the *rufescens* division has not begun either in *levipes* or in *platyops* and is but incipient in the *cervinipes* group.

The geographical range of this division includes all of New Guinea and several outlying islands, and northern and eastern Australia as far south as New South Wales (*M. cervinipes*).

I find myself unable to agree with Rümmler's conclusion that *M. moncktoni* and *M. platyops* are fully synonymous. I trapped both in some numbers in the Astrolabe Mountains behind Port Moresby in apparently identical environment, and, though the skulls and the skins of both resemble each other very closely, I am satisfied that they are in reality distinct from each other. *M. platyops* has the tail scales much larger than those of *M. moncktoni*, and in *platyops* each scale is provided with three hairs as against the one hair per scale in *moncktoni*. The skulls are distinguished less easily. In *platyops* the zygomatic plate is sloping, and the back of the palate reaches only to the middle of m^3 . In *moncktoni* the zygomatic plate is upright and extends well forward from the notch; the palate, provided with a median spine, extends behind m^3 ; the incisive foramina are shorter and rounded at both ends in Astro-

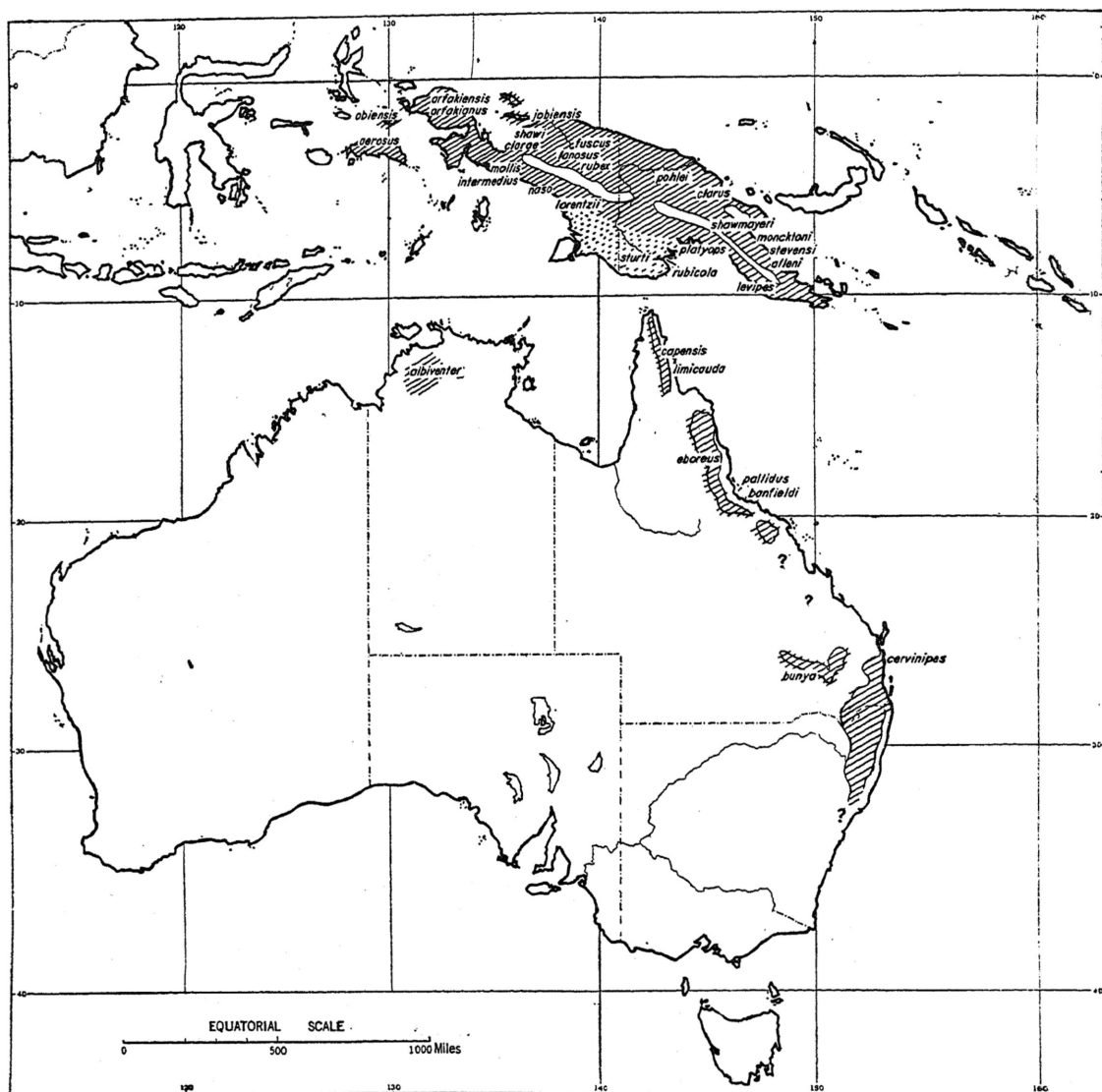


FIG. 3. Distributional pattern of a Papuan group of rodents within the genus *Melomys*, showing invasion of Australia through the moist rain belt of the east coast.

labe *moncktoni*, longer and with pointed ends in *platyops*.

True *moncktoni* is found from the Gira River area, through the Astrolabe area and the hill country of Port Moresby, throughout the upper Fly River basin. Westward it may be represented by *intermedius* of the Utakwa River at 2500 feet. It seems possible that typical *moncktoni*, with its well-developed, three-haired tail scales, represents the ultimate extension in northeastern New Guinea of

the *cervinipes* group.

On the contrary, despite intensive collecting throughout the Fly River area, not a single example of the one-haired, *platyops*-like animal was secured, while on the north side of the Central Range, and also high on their slopes, the one-haired form is common. This includes *mamberanus* Sody and the mountain dweller, *rubex* Thomas. If I am correct in my view, then, virtually all material referred by Rümmler to various races

of *moncktoni* are really *platyops*.

It must be pointed out that in northern New Guinea the *Melomys* of the present group are still in a state of transition, since occasional specimens occur, at Hollandia, in which some of the tail scales are subtended by three hairs, others by one. Segregation is incomplete, also, in the Idenburg-Cyclops lowlands in regard to the reduction of the scale hairs from three to one. In the mountains, however, it does appear to be complete (*rubex*), both westward (three specimens from the Weyland Mountains) and eastward (the form *tafa*).

To summarize, *platyops*, with *rubex* and *tafa*, is the species group of this division that inhabits north New Guinea and the highlands, while *cervinipes* plus *moncktoni*, unprogressive in scale hair reduction, occurs south of the mountains and across the Torres Strait to Arnhemland and Cape York and down the Australian east coast as far as New South Wales.

The three groups of this division of *Melomys* are the *Melomys levipes* group, the *Melomys cervinipes-moncktoni* group, and the *Melomys platyops-rubex* group.

THE *Melomys levipes* GROUP

I am unable to demonstrate that more than a single full species exists in this group. The species *levipes* comprises a number of races, all large sized, which are geographically separated from one another but may well intergrade along lines of contact. Most are mountain forms, but a few occur in the lowlands, where they dwell in the rain forests adjoining the larger mountain systems. The southern limit is near the mouth of the Strickland River, a tributary of the Fly River.

The group is anatomically the most primitive of those three that comprise the *levipes-platyops-cervinipes* division. The rostrum displays no sign of shortening. The structure of the tail scales is nearest to that of *Rattus*, though the "mosaic" pattern is distinctly present. The tail scales are unsculptured, and their combined effect is not file-like. The scale hairs are usually three per scale but in some cases are reduced to one.

Melomys levipes (Thomas)

This is a species of large-sized *Melomys*

distinguished by possessing the combination of elongate, nearly parallel-sided hind feet, 40 mm. or more in length, gray-based ventral pelage, the under side of the tail white, and the unornamented tail scales large, about 11 per centimeter (compare with those of the equally large *M. leucogaster* which has about 14 scales per centimeter).

The scale-hair count, as in the case of *M. platyops*, appears to be in a state of transition. That is to say, both three-haired and one-haired forms occur among the species. With the exception of a single individual of the race *lorentzii* from the Fly River all our material from a given area is consistently either three-haired or one-haired. The known races from this standpoint, based upon examination of their types, are:

Three-haired tail scales: *lanosus*, *rattoides* (= *shaw-mayeri*), and *lorentzii*

One-haired tail scales: *levipes*, *stevensi*, *mollis*, *naso*, *clarae*, *weylandi*, and *arfakiensis*

Little can be deduced from this arrangement from a geographical viewpoint. It will be noticed that none of the one-haired races lives in northern New Guinea. On the other hand the northern three-haired group has a representative, *lorentzii*, in the upper Fly River area which extends south as far as Lake Daviumbu, close to the junction of the Strickland River with the Fly River. The one-haired series occupies the eastern end of the island south of the Central Range and, interrupted by *lorentzii*, reappears at the south side of the western end as the lowland *naso*, the upland *mollis*, *clarae*, and *weylandi*, and into the Vogelkop, *arfakiensis*. More study on *aerosus* of the mountains of Ceram is needed.

All the three-haired races except *lorentzii* are dull colored, grayish brown. *M. lorentzii* is brighter, with a strong admixture of cinnamon, and thus more nearly resembles the smaller, eastern, true *levipes*.

THREE-HAIRED SECTION

Melomys levipes lorentzii Jentink

Melomys lorentzii JENTINK, 1909, Nova Guinea, vol. 9, p. 8.

TYPE: Leiden (field no. 132), adult male, from Resi Camp, Lorentz River, 900 meters,

collected September, 1907, by Nieuw Guinea Expeditie.

MATERIAL: A good series from the upper Fly River region: mouth of Palmer River, 16 (two more in alcohol); mouth of Black River, 14; Mt. Mabion, 3000 feet, one (20 skulls); Oroville Camp, 11; Lake Daviumbu, 50 feet, four. Total, 46.

All the above, including the type, have three hairs per scale, with one exception (A.M.N.H. No. 104975 from the Palmer River).

In all this series of specimens the maximum tail length is 143 mm. In true *levipes* the tail may attain a length of 160 mm. On the other hand the head and body length in *lorentzii* is greater, the maximum being 180 mm., with 175 mm. common; in *levipes*, maximum, 169 mm., with 160 mm. common.

The hind foot (s.u.) in *lorentzii* reaches a maximum of 35 mm., with 34 usual in adults. In the more lightly built *levipes* there is a maximum of 37 mm., and 35 mm. is commonplace.

This race appears in most respects to be transitional between the eastern *levipes* and the highland *lanosus*. It is colored almost exactly like *levipes* but has the three scale hairs of *lanosus*.

***Melomys levipes lanosus* Thomas**

Melomys lanosus THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 263.

TYPE: B.M. No. 22.2.22.26, old female, from Dormanpad Bivak, south of the Idenburg River, 2400 meters, collected October 30, 1920, by W. C. Van Heurn.

MATERIAL: A larger series from several stations a short way southeast of the type locality: Bele River, 2200 meters, 71; mountains 15 miles southwest of Bernhard Camp, Idenburg River, 1500, 1800, 2150 meters, 24; camp south of Lake Habbema at 2800 meters, 14. Total, 109.

As its name implies, this form has long soft fur, longest and softest at the highest altitudes, shorter and not so fine at levels as low as 1500 meters. Below this it seems to grade into the northern lowlands race *rattooides* from the standpoint of the quality of the pelage. However, the skulls of *lanosus* and the body and foot measurements are distinctly smaller than those of *rattooides*. The length

of the hind foot runs from 39 to 41 mm. in *lanosus*, from 43 to 45 mm. in *rattooides*.

The Bele River series includes a single specimen (A.M.N.H. No. 151297) that apparently suffered some physiological deficiency. In it the dorsal pelage has the hairs normally brownish-tipped, but lacks the black pigment of the basal portions of the hairs, so that the usual slaty bases have been replaced by whitish. The net color is a very pale grayish brown.

***Melomys levipes rattoides* Thomas**

Melomys rattoides THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 263.

TYPE: B.M. No. 22.2.2.25, adult male, from Pionier Bivak, Mamberano River, 200 feet, collected August 3, 1920, by W. C. Van Heurn.

MATERIAL: Idenburg River at 850 meters, 23; at 1200 meters, eight; also Mt. Dafonso, Cyclops Mountains, 4700 feet, five (C.N.H.M.).

A rather coarse-haired, brown, lowlands to midmontane form from northern New Guinea, and the largest-sized race of the *levipes* group of *Melomys*. Under parts dull white, with gray bases; under side of tail white.

[*Melomys levipes shawmayeri* Rümmler]

Melomys levipes shawmayeri RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 109.

TYPE: B.M. (field no. S.M.368), adult male, from Buntibasa district, Krätke Mountains, northeast New Guinea, 4000 to 5000 feet, collected August 6, 1932, by F. Shaw Mayer.

As I have seen only the type of this form I hesitate to synonymize it with *rattooides* from the Idenburg area farther west, though I suspect that must eventually be done.

Very like *rattooides* in appearance. Dorsal color brownish gray; under parts white, with the hair bases gray.

ONE-HAIRED SECTION

***Melomys levipes levipes* (Thomas)**

Uromys levipes THOMAS, 1897, Ann. Mus. Civ. Genova, vol. 38, p. 617.

Melomys levipes meeki RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 108.

COTYPES: Of *levipes*, B.M. No. 97.8.7.72,

adult male, and Genoa, No. C.E.2600, from Haveri, Astrolabe Range, 20 miles inland from Port Moresby, Papua, 700 meters, collected August-November, 1893, by Loria. Of *meeki*, B.M. No. 5.11.28.19, young adult male, from head of the Aroa River, Central Division, collected April 25, 1905, by A. S. Meek.

MATERIAL: From Astrolabe Range stations, Baruari, 19; Sogeri, one; Itiki, two; Kagi, on Kokoda Road, 24; Mt. Tafa, nine.

I was unable to distinguish any but age differences between the types of *levipes* and *meeki*. Moreover they come from the same general area on the mountain slopes behind Port Moresby, and our rather ample series demonstrates the continuity of range. Specimens from higher up the mountains (Tafa and Kagi) have slightly longer pelage than those from lower but are otherwise the same. The tooth rows are about 7.7 mm. in length. All specimens examined have one hair per tail scale. The scales are elongate and not raised or sculptured. The under side of the tail is white.

Melomys levipes stevensi Rümmler

Melomys levipes stevensi RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 109.

TYPE: M.C.Z. No. 29890, adult male, collected April 17, 1933, at Mt. Misim, near Morobe, 6700 feet, by H. Stevens.

MATERIAL: Eleven topotypes.

Dorsal color of type gray, with a slight tinge of brown. Ventral color grayish white, all hairs with dark gray bases. Tail white beneath. Tail scales longer than wide, 10 per centimeter, scale hairs one per scale, two-thirds of a scale length.

Skull with broad zygomatic plate showing pronounced shoulder; incisive foramina equally pointed at the ends. Back of palate without a median spine and placed slightly anterior to the back of m^3 .

This dull-colored form is very nearly related to typical *levipes* from south of the Central Range.

Melomys levipes mollis Thomas

Melomys mollis THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 210.

TYPE: B.M. No. 13.6.18.35, adult male, from Camp Padang, south slope of Mt.

Karstens, near the Utakwa River, Charles Louis Mountains, 5500 feet, collected by C. B. Kloss.

I have seen only the type. A long-haired race, somewhat more rufescent than *lanosus* and provided with one hair per scale, not three.

Melomys levipes naso (Thomas)

Uromys naso THOMAS, 1911, Ann. Mag. Nat. Hist., ser. 8, vol. 7, p. 386.

TYPE: B.M. No. 11.11.11.54, adult female, from Whitewater Camp, Kapari River, southwest Netherlands New Guinea, 400 feet, collected October 11, 1910, by Grant.

Pelage short and firm. Otherwise strongly resembling true *levipes* of eastern Papua. Size larger than *levipes*, subequal to *lorentzii*, from which the present race differs by having one scale hair instead of three. Only the type examined.

Melomys levipes clarae Rümmler

Melomys levipes clarae RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 108.

TYPE: Berlin, No. 45673, adult male, from Sumuri Mountain, Weyland Mountains, 2000 feet, collected by G. Stein.

Melomys l. clarae from 2000 feet and the next form, *M. l. weylandi* from 5000 feet, appear to be altitudinal forms of the lowland *M. l. naso* from 400 feet. I have seen only the types. Color rather dark fuscous brown; under parts dirty white, gray-based. Tail shorter than head and body, white beneath.

Melomys levipes weylandi Rümmler

Melomys levipes weylandi RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 107.

TYPE: Berlin, No. 45672, adult male, Kunupi Mountain, Weyland Mountains, 5000 feet, collected September 27, 1931, by G. Stein.

Color brighter red, zygomatic plate somewhat more upright, and molars narrower than in *clarae*.

Melomys levipes arfakianus Rümmler

Melomys levipes arfakianus RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 107.

TYPE: B.M. No. 29.5.27.40, adult female, from Tombioki, Arfak Mountains, 2000 feet, collected August 21, 1928, by F. Shaw Mayer.

No other specimens seen. This Arfak Moun-

tains form appears to represent the one-haired section of *M. levipes* of the main part of the island. The color is fuscous brown above, grayish buff beneath, with dark gray bases.

***Melomys aerosus* (Thomas)**

Uromys aerosus THOMAS, 1920, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 428.

TYPE: B.M. No. 20.7.26.24, adult female, from Mt. Manusela, central Ceram, 6000 feet, collected February, 1920, by the Pratt brothers.

MATERIAL: Only the type studied. Pelage rich, dark, fuscous brown; under parts brown, with gray bases; hair of hands and feet brown, tail fuscous above and beneath; vibrissae, 45 mm.; width of hind foot at base of metatarsals, 4.8 mm.; tail scales 13 per centimeter, scale hairs short, one-third to one-half of one scale length, three per scale.

Muzzle relatively elongate, its width, 5.7 mm.; nasals exceeding premaxillae; palate narrow; incisive foramina rather long; zygomatic plate well thrown forward. Molars large.

The relationships of this island form seem to be with the *M. levipes* group. This is suggested by the dimensions and by the length of the rostrum in relation to the rest of the skull.

THE *Melomys cervinipes-moncktoni* GROUP

As a rule writers have not designated the exact section of the genus *Melomys* from which they assumed the Australian species *cervinipes* (with its rather numerous races) to have originated. From the present study I have reached the tentative conclusion that *cervinipes* is most nearly allied to *M. platyops* and *M. moncktoni*, perhaps slightly closer to the latter.

Both *platyops* and *moncktoni* usually have tails shorter than the head and body. In *cervinipes* the tail is a little longer than the head and body. All three have three hairs to each tail scale. The skulls of *moncktoni* and *cervinipes* are in close agreement; the rostra of both show slight traces of shortening, while the rostrum of *platyops* is unshortened.

***Melomys cervinipes* (Gould)**

This is the larger of the two full species of *Melomys* found in Australia. The other is

lutillus (various races of it) which inhabits open or brush country, generally rather dry, not heavy rain forest. *Melomys cervinipes* is primarily a rain-forest species.

It is distinguished from its near relatives in New Guinea by its longer tail and, usually, longer incisive foramina (a few individuals of the race *capensis* have shorter foramina). From other long-tailed Papuan species of other divisions of *Melomys* it can be distinguished by details of skull and teeth set forth elsewhere.

The geographical range of *cervinipes* extends interruptedly from the tip of the Cape York Peninsula to northern New South Wales. It also occurs in the more humid parts of Arnhemland and Melville Island.

The races here recognized are:

WHITE UNDER PARTS

<i>rubicola</i>	Bramble Cay, off mouth of Fly River
<i>limicauda</i>	Whitsunday Islands, latitude 20° S.
<i>capensis</i>	Upper Cape York Peninsula
<i>albiventer</i>	South of Darwin

WHITE CHEST

<i>banfieldi</i>	Dunk Island
<i>pallidus</i> (part)	Hinchinbrook Island
<i>eboreus</i> (part)	Northern Queensland (including southern part of Cape York Peninsula)

DARKER UNDER PARTS (OCCASIONAL SMALL WHITE CHEST MARKS)

<i>pallidus</i> (part)	Hinchinbrook Island
<i>eboreus</i> (part)	Atherton Tableland
<i>bunya</i>	Bunya Mountains
<i>cervinipes</i>	South Queensland and north New South Wales

***Melomys cervinipes cervinipes* (Gould)**

Mus cervinipes GOULD, 1852, The mammals of Australia, pt. 4 (vol. 3), pl. 14 and text.

TYPE: Two cotypes, B.M. No. 52.12.15.1, adult female, and B.M. No. 53.10.22.11, both collected at Stradbroke Island, off Brisbane, by F. Strange. The latter was chosen as lectotype by Thomas.

MATERIAL: Northern New South Wales: Moseley's Ranch, four; Glen Ferneigh, one; Point Lookout Gorge, one (all localities close together and all specimens collected by H. C. Raven); Ebor (U.S.N.M.), two. Other records of specimens in the museums at Bris-

bane and Sydney include Beechmont, Kilroy, Imbil, and Mt. Tambourine, all in southeast Queensland.

True *cervinipes* taken at Glen Ferneigh in the months of September to October (end of winter) is quite long-haired (dorsal pelage, about 14 mm. in length). The dorsal color is a rather dull brown with shades of cinnamon in it; the under parts are dull buffy white, with the gray of the hair bases showing through. A patch on the under side of the neck is clear buff, without gray bases. Hands and feet pale brown. Tail blackish gray above and beneath, slightly paler beneath. Ears rounded, rather broad, not elongated.

This race, which by chance was the earliest described, apparently extends the farthest south of all Australian *Melomys*.

Melomys cervinipes bunya, new subspecies

TYPE: A.M.N.H. No. 162618, adult female, from rain forest bordering rest house, summit of Bunya Mountains, 3500 feet, collected January 17, 1948, by G. H. H. Tate.

GENERAL DESCRIPTION: A wholly gray member of the *cervinipes* group, strongly resembling the young of *Rattus assimilis*.

DESCRIPTION OF TYPE: Color gray above, passing into buffy low on the sides and dull white beneath, the white ventral hairs gray-based except on the throat where the roots are also white. Ears fuscous gray. Hands and feet buffy white. Tail gray above, pale beneath. Scales 13 per centimeter, the scale hairs in three's and about one scale length or slightly more. Mammae, 0.2=4 (also in paratype).

Skull of type with full braincase, short and narrowed interorbital region, and moderately short, heavy rostrum. Interparietal normally broad. Zygomatic plate somewhat sloping. Back of palate slightly anterior to back of m^{3-1} . Incisive foramina normally short but rather broader than in *cervinipes* of north-eastern New South Wales. Mesopterygoid fossa broad. Ectopterygoid fossae moderately deep. Bullae normally small.

MEASUREMENTS: (Field): head and body, 125 mm.; tail, 138; hind foot (s.u.), 27; ear from crown, 17. Skull (laboratory): condylo-basal length, 30.2; zygomatic breadth, 17.2; interorbital width, 5.3; interparietal, 10.5 by 4.0; nasals, 11.0 by 4.1 (greatest breadth); zygomatic plate, 3.5; palatal length, 16.4; in-

cisive foramina, 5.8 by 2.7; distance between m^{1-1} , 5.3; m^{1-4} , 6.7; m^1 , 3.5 by 2.0; m^2 , 2.0 by 2.0; m^3 , 1.3 by 1.5; m_{1-3} , 6.8.

There is a paratype taken at the same time and place which is virtually identical with the type.

Gray is a most unusual color for adult *Melomys* in Australia, and it is just possible that these rats may wear chestnut pelage at some other time of year. I suspect, however, that the Bunya Mountains animal represents a perfectly distinct race.

A series of seven skulls and three mandibles were also found in owl-cast material among the spreading roots of an ancient fig tree. The skulls are all fully adult, their upper molar tooth rows measuring 6.5 mm., 6.7, 6.5, 6.6, 6.7, 6.8, 6.7. If these are full adults and if *bunya* is based on somewhat younger material, considerable broadening of the incisive foramina must yet take place in the latter. The same foramina in true *cervinipes* of New South Wales are neither so wide nor so long as in this owl-caught material.

Melomys cervinipes eboreus Thomas

Melomys cervinipes eboreus THOMAS, 1924, Ann. Mag. Nat. Hist., ser. 9, vol. 13, p. 297.

TYPE: B.M. No. 22.12.18.11, adult male, Dinner Creek, near Ravenshoe, Atherton Tableland, north Queensland, 2900 feet, May 5, 1922, collector, T. V. Sherrin.

MATERIAL: Topotype (C.N.H.M. No. 35334); Ravenshoe (C.N.H.M.), two; Atherton Tableland, near Ravenshoe, taken by H. C. Raven, and virtual topotypes, five; Vine Creek (M.C.Z. No. 29241), one; Evelyn, one; Lake Barrine (G. Neuhäuser), eight; Herberton Range, 3000 feet, one; Mt. Spurgeon (G. Neuhäuser), seven. In lowlands below the Tableland: Babinda Creek (Raven), eight; Cairns (C.N.H.M.), one; Russell River, foot of Mt. Bellenden Ker, 12. North of Cairns and of the Atherton Tableland: Mt. Finnegan, 1100 feet, 20; 2800 feet, six. Total, 73.

Thomas differentiated this race from the typical form in New South Wales as "smaller, with a shorter tail, and rather darker in color . . . skull smaller . . ." He constructed a key to three species: *cervinipes*, *banfieldi*, and *australius* (a member of the *lutillus* group). He gave the distribution of *banfieldi* as "common on the Cape York Peninsula," but the

Cape York race is here separated.

Actually there are only slight differences between *eboreus* and true *cervinipes*. They are of the same general order as those between *Rattus a. coracius* and *R. a. assimilis*. Small, all-white throat patches and pectoral patches appear in a limited percentage of each race. In *eboreus* the chest patches become much larger than those of true *cervinipes*. In some cases the whole of the throat and chest is white. This seems particularly true in the series from Mt. Finnegan, about 50 miles north of Cairns. Some of the specimens from Hinchinbrook Island (*pallidus*) have also large, white pectoral areas.

[*Melomys cervinipes pallidus*
Troughton and LeSouef]

Melomys cervinipes pallidus TROUGHTON AND LE SOUEF, 1929, Australian Zool., vol. 6, p. 97.

TYPE: Sydney, No. M.4379, adult male, from Hinchinbrook Island, near Cardwell, north Queensland, September, 1928, collector, A. S. LeSouef.

MATERIAL: We have seven specimens from Hinchinbrook Island, collected by Gabriele Neuhäuser in May, 1938.

The color does not seem to be any more red than in the somewhat variable *eboreus* of the mainland. Only one specimen (A.M.N.H. No. 108967) is without white patches on the under side. Four have the whole of the throat and chest as well as the inguinal area completely white. It seems to me that *pallidus* is insufficiently differentiated from *eboreus* to be maintained as an insular race.

Melomys cervinipes banfieldi (De Vis)

Uromys banfieldi DE VIS, 1907, Ann. Queensland Mus., vol. 7, p. 8.

TYPE: Queensland Museum, number unknown, adult female, Dunk Island, Innisfail, north Queensland. Not seen by me.

MATERIAL: A male topotype at the British Museum, B.M. No. 26.1.16.2.

Unfortunately De Vis did not describe the ventral pelage of the type which Banfield sent him. However, the adult male topotype with the general characters of *cervinipes* has the under parts creamy white, almost without gray bases. Tail paler beneath than above. The scale hairs of the tail are 10 per centimeter, three hairs per scale, and one-third of

one scale length. There are also topotypes at Brisbane and Sydney.

Skull of the same specimen elongate, the profile somewhat arched; nasals slightly exceeding the premaxillae; incisive foramina rather large.

There seems to be no reason to regard this as anything but a weakly differentiated island race of *M. cervinipes*. *Melomys e. pallidus* is apparently derived from the mainland form, *eboreus*.

Melomys cervinipes limicauda Troughton

Melomys limicauda TROUGHTON, 1935, Rec. Australian Mus., vol. 19, p. 255.

TYPE: Sydney, No. M.5928, old male, Hayman Island, Whitsunday group near latitude 20° S., between Bowen and Mackay, north Queensland, collected by F. A. McNeill.

Troughton believed this *Melomys* to be "most nearly allied with *M. rubicola* from Bramble Cay The skull . . . is distinguished from that of *rubicola* by the much larger bullae Underside (fur) . . . entirely ivory white on the throat, chest, centre of belly, and inguinal region . . ." Tail dark brown above, lighter below. The principal reason for allying *limicauda* with *rubicola* was the rugosity of the tails of both; the scales of each, differing markedly in shape, were figured (Troughton, *ibid.*, vol. 19, fig. 2). Whitsunday Islands are 850 miles from Bramble Cay, the home of *rubicola*.

In *limicauda* the rostrum and bullae are more nearly in agreement with those of *M. cervinipes eboreus* of the adjoining mainland. In short, *limicauda* appears in my view to be a derivative of mainland *cervinipes*. It is true that the file-like character of the tail is accentuated, perhaps, as Troughton suggests, in response to a more "rugged" environment.

Melomys cervinipes melicus (Thomas)

Uromys melicus THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 215.

TYPE: B.M. No. 13.6.28.32, adult female, from Biro, Apsley Strait, Melville Island, Northern Territory, sea level, January 22, 1912, collected by J. P. Rogers.

Dorsal color of type brown; ventral color partly buff, with gray bases, but also pure

white to the roots of the hairs beneath the neck and on the inside of the limbs. Hairs of hands and feet buff. Tail scales 12 to 13 per centimeter, scale hairs three, three-fourths of one scale length.

Skull with rostrum short, its breadth 5.85 mm. Interorbital region with postorbital ridges; nasals slightly surpassing the premaxillae anteriorly; palate short; zygomatic plate strongly thrown forward, its anterior angle in advance of its base. Molars small and narrow.

There is a second specimen in the Perth Museum (No. M.805, female), Western Australia, and a third in the Museum of Comparative Zoölogy (M.C.Z. No. 14882, female). The latter has the same tail characters (but the hairs nearly one scale length). The white on the throat is virtually suppressed.

***Melomys cervinipes albiventer* Kellogg**

Melomys cervinipes albiventer KELLOGG, 1945, Proc. Biol. Soc. Washington, vol. 58, p. 69.

TYPE: U.S.N.M. No. 237782, adult male, 100 miles south of Port Darwin, Northern Territory (a camp at either Brooks Creek or Douglas River), collected October 20, 1920, by C. M. Hoy.

MATERIAL: Several topotypes.

The dorsal color is not distinctive. The under parts are white to the bases of the hairs. The scale hairs of the tail are three per scale and two-thirds of a scale length.

The skull of the type has the tips of the nasals broken, so those bones are therefore not measurable. The zygomatic plate has the anterior margin upright and is well thrown forward.

***Melomys cervinipes capensis*, new subspecies**

TYPE: A.M.N.H. No. 154198, adult male, upper Nesbit River, Rocky Scrub (east of Coen), 1500 feet, August 18, 1948, collectors, Tate and Van Deusen.

GENERAL CHARACTERS: Externally somewhat like the southern race of *rufescens* occurring north of the Torres Strait, but distinguished by anatomical characters of tail and skull. The white under parts separate it sharply from *M. c. eboreus* but ally it with *M. c. melicus* and *M. c. albiventer*, with which it appears to form a natural group.

DESCRIPTION OF TYPE: Dorsal color dull

rufous brown, with flecks of sandy brown, the gray bases showing through here and there. Under parts generally pure white to the roots, except in the thoracic region, where the white hairs adjoining the sides are gray-based. This narrows the self-colored area in the median thoracic region to about 1 cm. Ears dark brownish fuscous. Hands and feet white-haired. Tail light fuscous, but flesh-colored beneath. The tail scales rather large, 10 per centimeter, scale hairs three per scale, one-half to two-thirds of a scale length.

Skull of normal *cervinipes* character, the rostrum of moderate length; incisive foramina not very short; zygomatic plate rather high, its anterior edge straight and curving slightly to the notch, bullae not large.

MEASUREMENTS OF TYPE: Skin (field measurements): head and body, 139 mm.; tail, 179; hind foot (s.u.), 30.5; ear from crown, 16. Skull (laboratory): condylobasal length, 34.5; basal length, 33; zygomatic breadth, 18.2; least interorbital width, 5.8; interparietal width, 10; nasals, 12.8 by (greatest) 4.5; zygomatic plate, 3.8; palatal length, 18; incisive foramina, 6.2 by 2.5 (greatest at middle); width of pterygoid fossa, 2.8; m^{-3} , 6.3; m^1 , 3.2 by 1.7; m^2 , 2.0 by 1.8; m^3 , 1.1 by 1.3.

This race is represented by an ample series of topotypes totaling 14. There are also one from Camp Oven Pocket and nine from Shepherd's Battery Site, both at the head of the Peach River.¹ All three localities are in the McIlwraith Range.

The total result shows that this white-bellied race occurs throughout the rain-forest areas of the east side and northern tip of the Cape York Peninsula as far south as the McIlwraith Range. It probably occurs in isolated (possibly once united) pockets of rain forest along the eastern scarp of the divide southward to the Cooktown area (the single example from Black Mountain). Beyond that point its place is taken by the race *eboreus*, which we found abundantly at Shipton's Flat, 30 miles south of Cooktown.

There is a tendency towards extra large individuals (e.g., A.M.N.H. No. 154195) in

¹ Six of the nine from Shepherd's Battery Site are marked "Rocky Scrub," but Miss G. Neuhäuser, who collected them, assured me recently that she took them on upper Peach River exactly at the Battery Site.

the McIlwraith Range area. As their teeth show them to be old, it appears possible that they have lived a season longer than most and have grown larger. Another variation may occur in the same area; occasional individuals (e.g., A.M.N.H. No. 154199) show a flecking of white spots, the white extending to the roots of the hairs, among the prevailing gray-based, brown-tipped dorsal pelage.

***Melomys rubicola* Thomas**

Melomys rubicola THOMAS, 1924, Ann. Mag. Nat. Hist., ser. 9, vol. 13, p. 298.

TYPE: B.M. No. 46.8.26.7, adult male, from Bramble Cay, off the mouth of the Fly River, southern New Guinea, collected May, 1845, by J. MacGillivray, on the voyage of the "Fly."

MATERIAL: A topotype at Sydney, New South Wales.

Color of type now reddish brown, shading on the sides to grayish brown. Under parts buffy white. Tail scales 11 per centimeter, more or less ridged, scale hairs three per scale, two-thirds of a scale length.

Thomas compared this form with *M. c. banfieldi*. He specially emphasized the length of the tail.

I was inclined at first to place this *Melomys* with the *M. leucogaster* group, partly on account of its somewhat rugose tail scales. However, the greater proportionate length of the tail, the incisive foramina extending backward virtually to the level of the forward roots of m^{1-4} , and the fact that the incisive foramina are virtually as long as the tooth rows all indicate closer relationship with *cervinipes* than with *leucogaster*.

***Melomys moncktoni* (Thomas)**

This rather small species, comprising races with various shades of brown dorsal coloring and gray-based, white-tipped ventral pelage, has two close relatives, *M. platyops* and *M. cervinipes*. From *M. platyops* it is recognized by its slightly shorter muzzle; from *cervinipes*, by the fact that the tail is shorter than the head and body.

Melomys moncktoni is here considered to be confined to the southern half of New Guinea, with the exception of the east and west ends (*moncktoni* and *alleni* are both found in north-

east Papua). Rümmler (1938), when dealing with it synonymized *platyops*, an action that caused *moncktoni* to extend widely through northern New Guinea. But here *platyops* is employed for the north New Guinea races.

The southern limit of the species is reached at the lower Fly River (Sturt Island Camp on the left bank). No specimen was taken in the Oriomo area between the Fly River and Torres Strait.

***Melomys moncktoni moncktoni* (Thomas)**

Uromys moncktoni THOMAS, 1904, Ann. Mag. Nat. Hist., ser. 7, vol. 14, p. 399.

TYPE: B.M. No. 4.8.3.4, adult male, from longitude 148° 20' E., latitude 8° 20' S. (near Ioma and Buna), northeast coast of British New Guinea, September 12, 1903, collected by C. W. A. Monckton. Back of skull missing.

MATERIAL: Sogeri, seven; Itiki, one; Rona Falls, seven; Mekeo District (Bioto), one. Sogeri, Itiki, and Rona are close together in the Astrolabe Range; Bioto is farther to the northwest.

The type of *moncktoni*, superficially like *levipes*, is reddish brown; the under parts are buff, with gray bases. Hands and feet buff. Tail shorter than head and body, light fuscous above, paler beneath. Scales 10 per centimeter, longer than wide, flat; scale hairs three per scale; hairs one to one and one-fourth scale lengths.

Skull with unshortened rostrum; nasals exceeding premaxillae; zygomatic plate broad and its front edge straight. Incisive foramina short, broad, and rounded at both ends. Dental palate narrow. Pterygoid fossa broad.

I have been rather uncertain about referring the Astrolabe specimens to true *moncktoni*, but consider that it is desirable, especially because those specimens are so closely similar to *sturti* and *intermedius*, the connecting distribution along the south of the Central Range being provided by the two individuals from Mt. Mabion, upper Fly River.

***Melomys moncktoni sturti*, new subspecies**

TYPE: A.M.N.H. No. 105425, old female, Sturt Island Camp, lower Fly River, October 24, 1936, collected by G. H. H. Tate.

GENERAL CHARACTERS: A light-tawny rep-

representative of *moncktoni* with gray-based white under parts and tail darker above and lighter beneath. Distinguished from the nearby Australian *M. cervinipes capensis* by the fact that the tail is shorter than head and body.

DESCRIPTION OF TYPE: Light cinnamon brown above; under parts dull white, appearing grayish in spots because the gray-based hairs show through. A narrow, all-white pectoral spot. Hands and feet whitish. Tail slightly paler beneath than above. Scales 14 per centimeter, hairs one and one-half to two scale lengths, three per scale.

Skull with rostrum of moderate length; interparietal rather narrow; front of zygomatic plate upright; incisive foramina rather short, broad. Bullae small.

MEASUREMENTS OF TYPE: Skin (field measurements): head and body, 151 mm.; tail 116; hind foot (s.u.), 30; ear from crown, 18. skull, condylobasal length, 36.8; zygomatic width, 19.8; least interorbital width, 7.0; interparietal, 8.9; zygomatic plate, 4.4; palatal length, 20.1; incisive foramina, 5.8 by 2.6; bulla, 4.7; m^1 - m^3 , 6.6 (crowns worn).

Besides the type we have 25 topotypes. The light cinnamon dorsal color develops only with maturity. Young animals are darker and grayer.

***Melomys moncktoni intermedius* (Rümmeler)**

Uromys moncktoni intermedius RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 110.

TYPE: B.M. No. 13.6.18.42, adult male, Camp No. 3, Utakwa River, southwest Netherlands New Guinea, December 15, 1912, collected by C. B. Kloss.

Dorsal color brown; ventral color white, the hair bases gray. Tail fuscous above, whitish beneath. Scales 16 per centimeter, hairs three, about one scale length.

Skull with incisive foramina very short and rounded at both ends; zygomatic plate broad; bullae small.

***Melomys moncktoni shawi* Tate and Archbold**

Melomys shawi TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 2.

TYPE: A.M.N.H. No. 101959, adult male, Weyland Mountains, western Netherlands New Guinea, altitude 1200 meters, July 10,

1930, collected by F. Shaw Mayer.

Near *intermedius* but more richly rufescent.

***Melomys obiensis* (Thomas)**

Uromys obiensis THOMAS, 1911, Ann. Mag. Nat. Hist., ser. 8, vol. 7, p. 208.

TYPE: B.M. No. 3.4.10.1, adult female, Obi Island, west of New Guinea, received from Gerrard, a dealer. The back of the skull is broken.

This species has the under side of the tail paler than the upper, and each tail scale (the scales 14 per centimeter) has three hairs one-half to two-thirds of one scale length. This alone serves to remove it from *rufescens*. But it has also more elongate anterior palatal foramina (5.5 mm.). Thomas mentions that the ventral hair is white to the roots, but this feature alone is not sufficiently distinctive. There are certain members of the *cervinipes* group from the Fly River (Sturt Island Camp) which are indistinguishable externally from the local race of *rufescens* except by tail characters.

Rümmeler placed *obiensis* between *porculus* and *cervinipes*. I do not think it belongs near the former, but it is almost certainly related to the latter.

THE *Melomys platyops-rubex* GROUP

Short-tailed *Melomys* having a single hair per tail scale, gray-based ventral pelage, and skulls in which the rostrum is unshortened or even somewhat elongate. One branch of the group, *platyops*, inhabits lowland to midmontane habitats in rain forest in northern and eastern New Guinea. The other branch, *rubex*, is a high-mountain species with long, lax, dark-colored pelage.

Despite the reduced number of tail hairs, the present group is more primitive in skull characters than the *cervinipes* group. It is more nearly annectant to the *levipes* group, as the rostrum shows no sign of shortening as in *cervinipes* and *moncktoni*. It has not moved out of its center of origin, as *cervinipes* has.

***Melomys platyops* (Thomas)**

This appears to be the most nearly related species of its group to the *N. levipes* division, which it resembles in its unshortened rostrum and unspecialized tail scales. Reduction of

tail-scale hairs from three to one has been accomplished, in which respect it is more specialized than its allies *moncktoni* and *ceruinipes*.

Melomys platyops is in general a lowland species, having been found nowhere above 5000 feet. The races here recognized are:

<i>platyops</i>	Astrolabe Mountains, 1200 feet
<i>fuscus</i> (= <i>mamberanus</i>)	Idenburg River, 220 feet; Mamberano River, 180 feet
<i>arfakiensis</i>	Arfak Mountains, 2000 feet
<i>jobiensis</i>	Japen Island

***Melomys platyops platyops* (Thomas)**

Uromys platyops THOMAS, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 327.

TYPE: B.M. No. 5.11.28.18, adult male, from the head of the Aroa River, Central Division, Papua, collected April 25, 1905, by A. S. Meek.

MATERIAL: Mafulu, two; Baruari, two; Itiki, one; Sogeri, five (three Astrolabe Range stations).

Dorsal color of type brown, with some admixture of fuscous; ventral color grayish white, with all hairs gray-based. Tail shorter than head and body, dark above, pale beneath. Tail scales 13 to 14 per centimeter, almost flat, longer than broad; scale hairs one-half to three-fourths of one scale length and only one per scale. Hairs of hands and feet buffy white.

Skull elongate, with narrow, elongate rostrum; zygomatic plate broad, well thrown forward; incisive foramina short, pointed at both ends; mesopterygoid fossa wide; bullae small; dental palate narrow; molars rather large.

***Melomys platyops fuscus* Rümmler**

Melomys moncktoni fuscus RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 110.

Melomys platyops mamberanus SODY, 1937, Temminckia, vol. 2, p. 218.

TYPES: Of *fuscus*, B.M. No. 22.2.2.38, adult male, from Prauwen Bivak, Idenburg River, $\pm$ 70 meters, collected December 4, 1920, by W. C. Van Heurn. Of *mamberanus*, Sody collection No. 28, young male, from Pionier Bivak, Mamberano River, Netherlands New

Guinea, 60 meters, collected by W. C. Van Heurn. Skull in bad condition. There are two paratypes of *mamberanus* in equally bad or worse condition.

MATERIAL: Mt. Dafonsero, 4700 feet, Cyclops Mountains (C.N.H.M.), five.

Mr. Sody has very kindly permitted me to study and photograph the type of *mamberanus*. It is in juvenal pelage, the present color being brownish fuscous above, dull whitish, with the hair bases gray, beneath. The scale hairs are only one per scale and about one scale length.

The characters of the broken skull are: molars, 5.5 mm., short palatal foramina, 3.5 by 2.1; quite short rostrum (nasals missing, however); narrow zygomatic plate, 3.2. These conform quite closely to those of *M. rufescens sexplicatus*, but the skin does not. *Melomys sexplicatus* has the ventral hairs white to the roots; the present skin is like that of juvenal *M. platyops*.

The Chicago specimens show that *fuscus* extends well up the coastal ranges.

***Melomys platyops arfakiensis* Rümmler**

Melomys moncktoni arfakiensis RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 111.

TYPE: B.M. No. 29.5.27.28, adult male, from the Arfak Mountains, 2000 feet, collected August 21, 1928, by F. Shaw Mayer.

Color dark fuscous brown, beneath grayish white, with gray hair bases. Scale hairs 3 per scale, two-thirds of a scale length; scales 19 per centimeter.

***Melomys platyops jobiensis* Rümmler**

Melomys moncktoni jobiensis RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 114.

TYPE: Berlin, No. 45675, adult male, from Japen Island, Geelvinck Bay, collected March 13, 1931, by G. Stein.

Skin slightly more fulvous than that of *M. r. stresemanni*. Tail apparently as dark beneath as above.

***Melomys rubex* Thomas**

Like *M. platyops*, this is a mountain-dwelling species which has the number of scale hairs reduced to one. The pelage is long, lax, dark brownish, with much gray admixture. The under parts may be either pale gray with dark gray bases (*tafa*) or carry a surface

wash of pale yellowish brown (true *rutilus*). The tail is paler beneath than on top.

The skull much resembles that of *platyops* and of *moncktoni* but is smaller than either. The zygomatic plate slopes much as in *moncktoni*, more than in *platyops*. The third molar is especially small.

I would assign the following races to *rubex*: *tafa*, *alleni*, *clarus*, *stresemanni*, *pohlei*, *steini*, and *rutilus*. It seems improbable that they can all be maintained as distinct races.

[*Melomys rubex alleni* Rümmler]

Melomys moncktoni alleni RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 112.

TYPE: M.C.Z. No. 29902, adult female, Mt. Misim, 6700 feet, near Morobe, April 17, 1933, collected by H. Stevens.

MATERIAL: A paratype, M.C.Z. No. 29900, adult male, with badly broken skull.

The type is colored dorsally dark gray, with a faint wash of brown. The under parts are grayish white, with gray bases. Hands and feet white. Tail not paler beneath. Tail scales longer than wide, somewhat oval, 12 per centimeter, scale hairs one per scale, one-half a scale length.

Skull unbroadened and the muzzle scarcely shortened. Nasals slightly exceeding premaxillae. Incisive foramina short, slightly more pointed in front than behind. Bullae almost as long as incisive foramina. Zygomatic plate nearly upright, moderately broad, with slight shoulder. A post-palatal spine, the back of palate level with back of m^1 .

[*Melomys rubex tafa* Tate and Archbold]

Melomys tafa TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 1.

TYPE: A.M.N.H. No. 104340, adult female, from Mt. Tafa, offshoot of Central Range, Papua, 2400 meters, collected September 2, 1933, by R. Archbold.

A rather dark brown race, with the sides rufescent; under parts grayish white, with the gray bases of the hairs showing through.

[*Melomys rubex clarus* Rümmler]

Melomys moncktoni clarus RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 113.

TYPE: B.M. (field no. S.M.364), adult male, from Buntibasa district, Krätke Mountains,

4000 to 5000 feet, collected August 3, 1932, by F. Shaw Mayer.

In my notes I find no characters distinguishing this race from *tafa*. The two may be synonymous.

[*Melomys rubex stresemanni* Rümmler]

Melomys moncktoni stresemanni RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 113.

TYPE: Berlin, No. 45671, adult male, from Kulungtufu, Saruwaged, collected February 6, 1929, by E. Mayr.

This race also seems to be virtually the same as *tafa* and *clarus*.

[*Melomys rubex pohlei* Rümmler]

Melomys moncktoni pohlei RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 114.

TYPE: Berlin, No. 38938, from Hunstein Spitze, Hunstein Mountains, longitudes 142° to 143° E., latitudes 4° to 5° S., 1533 meters, collected March 5, 1913, by Bürgers.

Color reddish brown; under parts grayish white, the hairs with gray bases. The skull has the braincase slightly narrower than in other forms described by Rümmler under "*moncktoni*."

Melomys rubex rubex Thomas

Melomys rubex THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 263.

TYPE: B.M. No. 22.2.2.44, adult male, from Dormanpad Bivak, Mamberano River, 1410 meters, collected October 16, 1920, by W. D. Van Heurn.

Pelage long and soft, dark fuscous brown; ventrally buffy white and gray-based. Hands and feet buffy white. Tail scales 13 per centimeter, rather flat, longer than broad. Tail hairs one per scale, three-fourths of one scale length. Skull with flat profile; elongate narrow rostrum, short palatal foramina, wide mesopterygoid fossa, and rather large molars.

[*Melomys rubex steini* Rümmler]

Melomys moncktoni steini RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 111.

TYPE: Berlin, No. 45674, adult female, from Sumuri Mountain, Weyland Mountains, 2000 to 2600 meters, collected September 5, 1931, by Stein.

Slightly darker than *stresemanni*; otherwise scarcely differing from it.

[*Melomys rubex rutilus* Rümmler]

Melomys moncktoni rutilus RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 112.

TYPE: B.M. No. 13.6.18.36, adult male, from Camp No. 9, Utkwa River, southwest Netherlands New Guinea, 5500 feet, collected February 1, 1913, by C. B. Kloss.

Three specimens in alcohol (A.M.N.H. Nos. 108744–108746) from Mt. Mabion, 3000 feet, at the source of the Fly River, collected by G. H. H. Tate in 1936, come geographically between *rutilus* and *M. platyops platyops*.

Upper parts reddish brown, with a mixture of dark brown. Scale hairs one per scale, one-half of one scale length. Scales 14 per centimeter.

THE *Melomys lutillus-rufescens-leucogaster* DIVISION

This division is to be regarded as more specialized than the *Melomys cervinipes-platyops-rubex* division. The prime characters denoting the more specialized level relate in part to acquisition of a more scansorial habitus—shortened, broadened head and rostrum, and broadened, climbing type of hind foot. In addition, with the exception of the slightly less advanced *lutillus* group, the “mosaic” tail pattern has assumed the full “file-like” character to be seen in the genus *Uromys*. The division comprises three groups: the *Melomys lutillus* group, the *Melomys rufescens* group, and the *Melomys leucogaster* group.

The *M. lutillus* group can be considered the least modified of the three groups, both because of its preservation of three hairs to each tail scale and because of its still partly terrestrial form of foot, though the skull is already modified. In general the races here included are exceptionally small in size. All the forms of *lutillus* are thus small, though the larger, new form, *M. frigidicola*, retains approximately the dimensions of *rufescens*. Also, the *M. lutillus* group comprises mice that prefer well-illuminated habitats such as the Australian open forest, grassy country, and the heath-like uplands of central New Guinea, in contrast to the mainly rain-forest habitats occupied by *rufescens* and *leucogaster*.

The *M. rufescens* group preserves what seems to be the size norm for the genus. It has advanced beyond the *lutillus* section struc-

turally, for the foot is completely scansorial and the tail scales are fully file-like. The tail scales are strongly raised and sculptured, and the scale hairs are reduced to one per scale. Shortening of the skull and rostrum has advanced considerably but has not quite attained the extreme to be seen in the *leucogaster* group. The skins of *rufescens* and *leucogaster*, as well as of *lutillus* in part, are distinguished by the extent of the snowy white fur of the under parts, white to the roots, in contrast to the gray-based white under parts of the *M. cervinipes-platyops-levipes* division. The tail is blackish beneath as well as on top in both the *rufescens* and *leucogaster* groups but is not invariably so in the *lutillus* group. The distribution of *rufescens* and relatives includes virtually the whole of New Guinea below 7500 feet, except open grassy country, and even there (the Oriomo savannas) the group occurs in the gallery forests fringing streams. Though it reaches the extreme south coast of New Guinea, it has not been discovered in Australia.

The *M. leucogaster* group, most specialized of the three groups, besides exhibiting the arboreal features of *rufescens* and its races, has become larger in size than is normal for *Melomys*—as large as *levipes*. Its color is usually brownish gray above, pure white beneath; the long tail black above and beneath. The tail scales and scale hairs are specialized as in *rufescens*. The foot is strongly scansorial in character, narrow at the ankle, broad at the distal ends of the metatarsals. The broad skull has the rostrum very short. Like the *rufescens* group, *leucogaster* with its allies is found through all forested New Guinea. It seems confined to land lower than 4000 feet. It has not reached Australia but has penetrated to many of the offshore islands of Papua and even to Talaud, where the local form is bright reddish in color.

This is the one group of all *Melomys* that comes closest anatomically to *Uromys*. It has the fully modified tail, the scansorial foot, the rather short ears, and massive skull structure of that genus. However, its members remain relatively small in size.

THE *Melomys lutillus* GROUP

The *Melomys lutillus* group is composed of the smallest-sized members of the *leucogas-*

ter-rufescens-lutillus division of *Melomys*. Though it agrees with *leucogaster* and *rufescens* in the possession of a short, broad skull with short rostrum (but rather long palatal foramina), it diverges in the characters of the tail. The tail scales are not markedly raised as in *leucogaster* and *rufescens*. They are accompanied not by a single minute scale hair but by three hairs which vary in length from one-third of one to one scale length. The tail is not dark beneath as well as above and so differs less sharply from the *platyops* or *levipes* type of tail than that of *rufescens* and *leucogaster*.

The foot length in most forms varies from 22 to 26 mm. (s.u.), but in the larger, new form, *frigicola*, from the New Guinea highlands the foot may reach a length of 29 mm.

The forms of *Melomys* of the *lutillus* group occupy generally open country and may become locally abundant in areas formerly forested, which have secondarily become grasslands. Though mainly Torresian, the group is also represented in the highlands around Lake Habbema by the large, long-haired form, *frigicola*, and occurs, furthermore, in open areas on the north coast of New Guinea (near Lake Sentani and the River Mamberano). In Australia it is found throughout the open country of the Cape York Peninsula, Groote Eylandt, and probably on the mainland of Arnhemland. Until recently it was recorded only as far south in coastal Queensland as Mackay (McDougall, 1944, 1946), but the discovery of *callopes* by Finlayson at Duaringa near Rockhampton, and of a second specimen by me at Byfield, carries the range of the *lutillus* group to latitude 23° S.

Melomys lutillus (Thomas)

It is doubtful that more than the single species *lutillus* can be counted in this group. Two doubtful cases come to mind: *callopes* Finlayson, southernmost member of the group and my new *frigicola* from the very high open country north of Mt. Wilhelmina. As they present virtually no differences of specific value and behave as geographical representatives, I have placed them with other races of *lutillus*.

As for such races of *M. lutillus* as *muscalis*, *froggatti*, *australius*, *littoralis*, etc., each is so variable that, with locality labels removed, I doubt whether specimens of one could be

surely distinguished from any other on a subspecific basis. Every student knows that slight differences between one specimen and another can easily be found, but such differences, even between specimens from places hundreds of miles apart, do not necessarily indicate racial distinction. With varying series of 140 *muscalis* and 65 *australius* for study, characters must be definite and consistent to have taxonomic value. In a very general way it can be said that the southern forms, from Cairns southward, attain a somewhat greater size, and that the northern forms, from the Cape York region and south New Guinea lowlands, reach a somewhat smaller size in age.

Melomys lutillus lutillus (Thomas)

Uromys lutillus THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 216.

TYPE: B.M. No. 5.11.28.20, adult male from Owgarra, Angabunga River, Central Division, Papua, collected November 3, 1904, by A. S. Meek.

MATERIAL: Collecting stations on the Astrolabe Range: Mafulu, six; Rona, three; Sogeri, 13; also, from Kokebagu near Rigo, four.

Dorsal color of the type dull grayish brown. Under parts fawn, with grayish bases, pure white on the throat. Hands and feet buff. Tail fuscous above, whitish beneath; tail scales 15 to 16 per centimeter, hairs three per scale, three-fourths of one to one scale length.

The fawn ventral color is fairly consistently maintained in our series, in contrast to the predominantly white (but some fawn) under parts found in the southern races.

Melomys lutillus muscalis (Thomas)

Uromys muscalis THOMAS, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 217.

TYPE: B.M. No. 86.5.16.4, adult male, from "lower Fly River," Western Division, Papua, collected by the Rev. S. MacFarlan.

MATERIAL: Stations in south New Guinea (Western Division): Daru, 15; Mabaduane, 10; Old Mawatta, two; Gaima, 12; Dogwa, 15; Wassi Kussa and Bugi, 16; Lake Daviumbu, 70. Total, 140.

Melomys l. muscalis is quite variable in pelage, color, and size. Our series taken as a whole is weakly and doubtfully distinguishable from our smaller series of true *lutillus*.

[*Melomys lutillus froggatti* Troughton]

Melomys muscalis froggatti TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 123.

TYPE: Sydney, No. M.2377, adult male, from Strickland River, 100 miles above its junction with the Fly River, south New Guinea, collected in 1885 by W. W. Froggatt, Royal Geographical Society Expedition.

MATERIAL: The type was studied and photographed.

I have retained this race from the middle Strickland provisionally but feel that it is probably synonymous with the quite variable *muscalis*, of which we now have 140 specimens.

***Melomys lutillus murinus* (Thomas)**

Uromys murinus THOMAS, 1930, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 216.

TYPE: B.M. No. 99.9.10.3, adult female, from Murray Island, Torres Strait, collected by A. C. Haddon.

Very close to *muscalis* and *australius*. Dorsal color brown; ventral color creamy white, the hairs white to the roots. Tail scales 13 per centimeter, tail hairs three per scale, three-fourths of one to one scale length.

***Melomys lutillus australius* Thomas**

Melomys australius THOMAS, 1924, Ann. Mag. Nat. Hist., ser. 9, vol. 13, p. 298.

TYPE: B.M. No. 15.3.5.51, adult female, from Piara, northwest of Somerset, extreme north of Cape York Peninsula, 20 meters, collected August 10, 1913, by R. Kemp.

MATERIAL: Lockerbie, 8 miles west-southwest of Somerset, tip of Cape York Peninsula, two; Portland Roads, one; Iron Range, 27; Mt. Tozer Camp, nine; Mt. Tozer, 1400 feet, five; Brown's Creek, three; Wenlock, one; Archer River, three; upper Peach River, seven; Camp Oven Pocket, five; Seagren's Farm, Kilometer 10, Cooktown-Laura Railway, one; Shipton's Flat, five. Total, 69.

Dorsal color of type brown; ventral color, except along midline, which is pure white, light fawn with gray bases. Hands and feet white. Tail paler beneath than above, scales 16 per centimeter, scale hairs three-fourths of one to one scale length.

This race is evidently as variable as the races on New Guinea. Both of our specimens

from Lockerbie, close to the type locality, have more white on the under parts than appears in the type. There is no fawn coloring in either. In older animals a fawn wash commonly develops at either side of the mid-ventral area, but this is not invariable.

Melomys l. australius appears to be scarce at Lockerbie. Both of the nearly topotypical specimens were taken at the edge of rain forest, an unusual location for this species. At Iron Range this form was quite readily taken in open eucalyptus forest, if there was also a good cover of long grass, and also in bushy gullies cutting through "open forest."

***Melomys lutillus mixtus* Troughton**

Melomys mixtus TROUGHTON, 1935, Rec. Australian Mus., vol. 19, p. 257.

TYPE: Sydney, No. M.5397, adult male, allotype, young female, from Groote Eylandt, west side of Gulf of Carpentaria, Northern Territory, collected in 1930 by the Rev. H. E. Warren.

Troughton found several characters by which he differentiated this race from *australius* and *murinus*. It is doubtful that they will remain valid when larger series can be compared.

The type is a small, dull, reddish brown *Melomys* with under parts self-colored buff. Tail paler beneath than above. Tail hairs in threes; one scale length.

***Melomys lutillus littoralis* (Lönnberg)**

Uromys littoralis LÖNNBERG, 1916, K. Svenska Vetensk. Akad. Handl., vol. 52, no. 2, p. 5.

TYPE: Stockholm, No. 44, young adult female, on the beach at the mouth of Russell River, north Queensland, collected May 9, 1913, by E. Mjöberg.

Dorsal color drab, mixed with blackish hairs; under parts light buff, according to Lönnberg. Bases of ventral hairs "plumbeous gray." Throat yellowish white. Tail wholly dark. Scales 18 to 19 per centimeter.

Troughton, after discussing *mixtus*, went on to write of specimens of "*littoralis*" from Ingham and from Ayr. Geographically this fills in part of the gap between Cairns and Rockhampton, the recorded southern limit for the species. I do not doubt that in due course other records will further narrow the gap between *littoralis* and *callopes*.

***Melomys lutillus insulae* Troughton and LeSouef**

Melomys littoralis insulae TROUGHTON AND LESOUEF, 1929, Australian Zool., vol. 6, p. 96.

TYPE: Sydney, No. M.4382, adult male, from Hinchinbrook Island, near Cardwell, north Queensland, collected September, 1928, by A. S. LeSouef.

Troughton and LeSouef stated that the tail was shorter and the tail scales were larger than in *littoralis*. Nests of this animal were circular, 5 inches in diameter, and built off the ground among the stems of "bladey" grass.

***Melomys lutillus callopes* Finlayson**

Melomys callopes FINLAYSON, 1942, Trans. Roy. Soc. South Australia, vol. 66, p. 243.

TYPE: Adelaide, Finlayson collection (no number given), from about 30 miles southwest of Duaringa, southwest of Rockhampton, central Queensland, collected by H. H. Finlayson.

MATERIAL: I collected a specimen (A.M.N.H. No. 162620), male, at Byfield, northeast of Rockhampton, which seems to agree with Finlayson's *callopes*. The tail and incise foramina are shorter than those of the type. The specimen came from a scrub-edged brook between open pastures.

***Melomys lutillus hintoni* Rümmler**

Melomys lutillus hintoni RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 106.

TYPE: B.M. No. 27.4.1.6, adult female, from Sentani Lake, Hollandia, north coast of Netherlands New Guinea, received from the Basel Museum.

This is the first representative of *M. muscalis* to be recorded from north of the Central Range of New Guinea. It is known so far only from the type. Despite the large amount of collecting done by the Archbold expedition and later by the United States Army in the neighborhood of Hollandia, the animal has not again been found.

***Melomys lutillus frigidicola*, new subspecies**

TYPE: A.M.N.H. No. 151201, adult male, Bele River, 18 kilometers north of Lake Habema, near Mt. Wilhelmina, Netherlands New Guinea, 2200 meters, collected November 23, 1938, by W. B. Richardson.

GENERAL CHARACTERS: A large-sized, long-haired relative of *M. lutillus*.

DESCRIPTION OF TYPE: Length of dorsal pelage, 15 to 17 mm. Color dull brownish gray, composed of dull cinnamon tips, gray bases, and a few blackish gray guard hairs which, however, scarcely extend beyond the wool hairs. Lower parts of sides very pale tan as is usual in the group. Ventral hairs with a narrow strip of self-colored creamy white. Hands and feet creamy. Tail dark above, paler beneath. Scales (slightly stretched) 12 per centimeter, each with three scale hairs. Each scale hair about one-half of one scale length.

Skull very similar to that of *lutillus* but larger. Dorsal profile well arched. Rostrum rather short. Zygomatic plate straight, but little thrown forward. Anterior palatal foramina normally elongate for the group. Back of palate level with middle of m^{2-3} .

MEASUREMENTS OF TYPE: Head and body, 130 mm.; tail, 142; condylobasal length, 29; hind foot (s. u.), 29; ear from crown, 14. Skull: least interorbital width, 4.7; mastoid width, 12.3; zygomatic plate, 3.5; palatal length, 5.8; anterior palatal foramina, 5.1 by 2.0; length of bulla, 4.8; m^{1-3} , 6.0; m^1 , 3.0 by 1.9; m^2 , 1.9 by 1.9; m^3 , 1.2 by 1.4.

The type is accompanied by 81 topotypes. There are also 69 specimens from the near-by Balim River, at 1600 meters.

It seems probable that this locally abundant *Melomys* occurs throughout the semi-open country of the central highlands to the north of Mt. Wilhelmina and invades the second-growth areas which develop after deforestation by the native gardeners of the region.

THE *Melomys rufescens* GROUP

Pelage usually dark brown, with traces of rufous. Under parts usually white to the base of the hairs. Feet heavy, distally broad, of scansorial type. Tail provided with strongly keeled scales of "mosaic" pattern, its under side as dark as the upper side. Skull short and broad, with short, heavy rostrum, well-developed temporal ridges, bullae small, incise foramina usually short and pointed in front, the septum broad. Molars rather narrow, their length usually from 5.5 to 6.5 mm.

As here arranged it comprises but the single species *rufescens*, with several races.

***Melomys rufescens* (Alston)**

This distinctive type of *Melomys* is of mod-

erate size (for the genus), often rather bright cinnamon above, and in most of its forms has the ventral hairs snow-white to the roots, though they are sometimes discolored by dirt. The mountain race *gracilis* has this white area somewhat reduced by encroachment of the lateral brown color, and *sexplicatus*, the race found about Hollandia, may have the white faintly tinged with buffy. The tail, as in *rufescens* proper, is blackish above and below, and each fine, raised, granular scale is subtended by one hair which is about one-half of one scale length.

The geographical distribution in New Guinea apparently takes in the whole of the forested areas, including even gallery woods between expanses of savanna. Thus it reaches the extreme south coast adjoining the Torres Strait. In the mountains it reaches a recorded maximum altitude of 7500 feet, at Mt. Tafa, as the long-tailed race *gracilis*. I collected specimens near by at Kagi, on the Moresby-Kokoda track at 5000 feet. It reaches 2200 meters (race *sexplicatus*) south of the Idenburg River. It seems not improbable that *dollmani* from the Krätke Mountains on the north side of the Central Range may be identical to *gracilis*.

The lowland form *niviventer*, inhabiting the Fly River basin and all of south New Guinea, averages smaller than the forms from elsewhere and forms a distinct entity. On the other hand animals from the Cyclops Mountains, Sentani Lake, the Idenburg River, and the mountains south of it are in general larger than *stalkerii*. I am disposed, then, to recognize six mainland races of this species (*rufescens*):

stalkerii from the northeast of New Guinea
gracilis (= ? *dollmani*) from the eastern mountains
hageni from central mountains of New Guinea
calidior from western New Guinea
niviventer from south New Guinea
sexplicatus from the north coast, Idenburg River, and Balim River area

***Melomys rufescens rufescens* (Alston)**

Uromys rufescens ALSTON, 1877, Proc. Zool. Soc. London, pp. 124, 743.

Mus musavora RAMSAY, 1877, Proc. Linnean Soc. New South Wales, vol. 2, p. 16.

TYPES: Of *rufescens*, B.M. No. 77.7.18.27, adult female, from "Duke of York Island or

adjacent parts of New Britain or New Ireland," collected by the Rev. J. Brown. Of *musavora*, Sydney, Nos. M.2367, M.2368, adult male and female, collected by Cockerell, both from the Duke of York Island.

MATERIAL: I have studied the type of *rufescens* and the two cotypes of *musavora*.

In the following two paragraphs I compare the types of *rufescens* and *musavora*, with the second in parentheses.

The skin of the type of *rufescens*, short and crisp in comparison with that of *cervinipes*, is now colored rufous brown (of the cotypes of *musavora* "brown"); under parts white to the bases, though dirty (area of self-colored buffy white hairs 25 to 30 mm. in width, extending from chin to tail). Hands and feet buffy white (buffy, self-colored). Tail fuscous on top and beneath (black above and below). Scales 17 per centimeter (unknown). Scale hairs one per scale except just at base (in three's at base of tail); their lengths one-half to three-quarters of one scale length (about three-quarters of one scale length). Hind foot of scansorial type, with strong claws, broad at base of toes but narrowing at ankle, its width at base of fifth metatarsal 4.7 mm. (unknown). Vibrissae, 50 mm.

Skull with muzzle broad and short, its width 5.8 mm. (skull short); nasals slightly exceeding premaxillae; zygomata moderately flaring (broad). Mesopterygoid fossa wide (lyrate, with small, median, post-palatal spine); deep orange incisors orthodont (slightly opisthodont); anterior palatal foramina short (same); back of palate not quite reaching back of m^3 - 3 ; m^1 not broadened.

These detailed descriptions are offered because of the rarity of topotypical *rufescens* in collections and its geographical distance from the New Guinea mainland.

Melomys bougainville Troughton from Bougainville Island, 200 miles to the southeast of Duke of York Island, which agrees closely with *rufescens*, is held to be at best a race of that species.

***Melomys rufescens bougainville* Troughton**

Melomys bougainville TROUGHTON, 1936, Rec. Australian Mus., vol. 19, p. 344.

TYPE: Sydney, No. M.5757, adult male, from Bouin, Bougainville Island, collected by Father Poncelet.

MATERIAL: Only the type was seen.

Troughton gives the color as "bright yellowish red . . . the centre of the back . . . russet sayal brown; . . . rump . . . cinnamon-rufous. [Under parts] ivory or buffy white . . . Distinguished [from *rufescens*] by its narrower rostrum . . . zygomatic plate lighter . . . interorbital region somewhat broader." Troughton also found differences in the nasals, the palatal foramina, and the molars.

Frechkop (1948) records additional specimens, from Bouin.

***Melomys rufescens stalker* (Thomas)**

Uromys stalker THOMAS, 1904, Ann. Mag. Nat. Hist., ser. 7, vol. 14, p. 202.

TYPE: B.M. No. 4.6.7.11, adult female, from Gira River, longitudes 147° to 148° E., latitudes 8° to 9° S., between Ioma and Morobe, Northern Division, Papua, 500 to 800 feet, collected by W. Stalker.

Dorsal color of type dull brown; under parts buffy white to the roots; tail scales 17 per centimeter; skull very like that of *rufescens*; the breadth of the rostrum, 5.7 mm.

***Melomys rufescens gracilis* (Thomas)**

Uromys gracilis THOMAS, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 328.

TYPE: B.M. No. 5.11.28.15, adult female, from Owgarra, Angabunga River, Central Division, Papua, collected November, 1904, by A. S. Meek.

MATERIAL: Mt. Tafa, 6200 feet, two; Mafulu, 4000 feet, one; Kagi, 5000 feet, five.

Dorsal color of type rather light brown, mixed with grayish. Under parts pure white to roots. Tail longer than body, its scales 16 per centimeter, scale hairs one, three-fourths of a scale length. Width of rostrum of skull, 4.7 mm.

The dull brown is usual, but individuals exist that are somewhat more reddish and so approach true *rufescens* in appearance. The white under parts are usually much narrowed by encroachment of the lateral coloring.

[*Melomys rufescens dollmani* Rümmler]

Melomys rufescens dollmani RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 106.

TYPE: B.M. (field no. S.M.343), adult male from Buntibasa district, Krätke Mountains,

northeast central New Guinea, 4000 to 5000 feet, collected July 11, 1932, by F. Shaw Mayer.

Rümmler considered this paler than *gracilis*. He found the zygomata broader, the incisive foramina broader, and the molar tooth row shorter.

***Melomys rufescens sexplicatus* (Jentink)**

Pogonomys sexplicatus JENTINK, 1907, Nova Guinea, vol. 5, p. 366.

TYPE: Leiden, No. A, adult female, from Sentani Lake, Hollandia, north coast of Netherlands New Guinea, collected April 2, 1903, by Wickman expedition. A flat skin with its skull.

MATERIAL: Hollandia (A.M.N.H. No. 110 086 and C.N.H.M. Nos. 54061 and 54064), three; Balim River, 1600 meters, five; Lake Habbema, 2200 meters, one; Cyclops Mountains, two; Hollandia, one.

Color of type red-brown above, the face slightly grayer; under parts creamy white to the roots. Tail scales 19 per centimeter, three hairs, one per scale, one-half of one scale length. This is typically a short-haired, chiefly lowland form, perhaps little distinguishable from the bright-colored *rufescens*.

***Melomys rufescens hageni* Troughton**

Melomys hageni TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 124.

TYPE: Sydney, No. M.6113, adult male, from 5000 to 6000 feet in the upper Waghi River valley, east of Mt. Hagen, Sepik Division, New Guinea, collected by G. A. M. Heydon. The Waghi is one of the headwater tributaries of the Purari River which flows to the Gulf of Papua.

Troughton describes this as "bright buckthorn-brown, . . . clearest on the nape, lightly pencilled with cinnamon-brown, the head a lighter grizzling of warm-buff and grey. Sides and limbs . . . clearer ochraceous-buffy, mingling with the grey of the underfur to extend across the . . . belly; hair of under surface only entirely white in patches on the throat, upper chest, and inguinal area."

This apparently represents a western extension of *gracilis*. The narrowing of the ventral self-colored hairs by invasion of the gray-based lateral hairs in *gracilis* is carried to complete interruption in *hageni*.

***Melomys rufescens niviventer*, new subspecies**

TYPE: A.M.N.H. No. 105431, adult male, Sturt Island Camp, left bank of lower Fly River, October 30, 1936, collected by G. H. H. Tate.

GENERAL CHARACTERS: A small, brightly colored race of *rufescens* with quite small teeth, related to *calidior* in the west (Mimika River) and *stalker*i towards the east.

DESCRIPTION OF TYPE: Dorsal color warm cinnamon, becoming grayish on the face. Under parts white, the hairs white to the roots. Feet and hands buffy white. Tail dark fuscous above and beneath, its scales and hairs as in *rufescens*, scales 16 per centimeter, hairs one per scale, one-half scale length.

Skull much like that of *rufescens* or *calidior* but smaller, with short incisive foramina, small bullae, and narrow molars. Zygomatic plate broad, its front edge nearly upright.

MEASUREMENTS OF TYPE: Skin (field measurements): head and body, 121 mm.; tail, 125; hind foot (s.u.), 26; ear from crown, 14. Skull: condylobasal length, 31.0; zygomatic breadth, 16.0; least interorbital width, 5.6; nasals, 11.1 by (greatest) 4.0; zygomatic plate, 3.6; palatal length, 16.4; incisive foramina, 4.6 by 2.4; bulla, 4.7; m^{1-3} , 5.9; m^1 , 3.0 by 1.8; m^2 , 2.0 by 1.8; m^3 , 1.0 by 1.1.

To this race I refer a scattering of individuals from the Fly River basin and the Oriomo country south of it as follows: paratypes, seven; Wuroi, two; Lake Daviumbu, three; Palmer River station, upper Fly River, five; mouth of Black River, upper Fly River, one; and, on the south coast, Tarara, Wassi Kussa, two.

The young are grayer, and assume the full cinnamon hue only at maturity.

***Melomys rufescens calidior* (Thomas)**

*Uromys stalker*i *calidior* THOMAS, 1911, Ann. Mag. Nat. Hist., ser. 8, vol. 7, p. 387.

TYPE: B.M. No. 11.11.11.36, adult male, from Mimika River, southwest Netherlands New Guinea, 420 feet, collected March 30, 1910, by G. C. Shortridge.

MATERIAL: Gebroeders Range, western New Guinea, two.

Pelage of type dull brown dorsally; under parts self-colored creamy white. Tail scales

15 per centimeter, scale hairs three per scale, one-half to two-thirds of one scale length.

Skull with rostrum even shorter than that of *rufescens* or *stalker*i. Palatal foramina quite short and narrowly pointed in front. Bullae small. Zygomatic plate wide and straight.

This race is apparently the most westerly of any described. It is only weakly separable from *sexplicatus*, but I think can be readily separated from the new, brightly colored *niviventer* from the Fly River basin and south New Guinea generally.

THE *Melomys leucogaster* GROUP

Strong, actively climbing species of *Melomys*, allied to the *rufescens* and *lutillus* groups, but larger and heavier.

The group contains the species *leucogaster*, *arcium*, *fulgens*, and *caurinus* (with *talaudium*). Only *leucogaster* occurs on New Guinea, the others being found on various islands. The last two from the Talaud Islands mark the extreme northwestern penetration by this genus. Southward, it reaches the mouth of the Fly River but has not apparently crossed to Australia.

***Melomys leucogaster* (Jentink)**

This is a very distinct species of large size and brownish gray color inhabiting most of New Guinea. It extends from the Lorentz River or farther west to the Kemp Welch River or farther east. It occurs throughout the Fly River basin from near the source of the Fly to Daru at its mouth. On the north coast it is found at Hollandia. Although I have continued to treat *latipes* of eastern New Guinea and *rubicola* of the mouth of the Fly River as slightly differing subspecies, I am almost of the opinion that they should be reduced to synonyms of *leucogaster*.

Melomys leucogaster rather closely resembles *Pogonomelomys bruijnii*, of which the race *brassi* is also present in the middle Fly area. *M. leucogaster* has the tail scales very much smaller than those of *P. bruijnii*, and they are furnished with but one scale hair instead of with three.

One other *Melomys*, *M. rufescens gracilis*, of the midmontane forests of the Port Moresby area is colored somewhat like *M. leucogaster*. But, though long-tailed, it is consid-

erably smaller, and differs furthermore in its skull and teeth.

***Melomys leucogaster leucogaster* (Jentink)**

Pogonomys leucogaster JENTINK, 1908, Nova Guinea, vol. 9, p. 3; 1911, *ibid.*, vol. 9, p. 173.

TYPE: Leiden (field no. 119), adult female, from Alkmaar, Lorentz River, south Netherlands New Guinea, collected August 11, 1907, by the Nieuw Guinea Expeditie.

MATERIAL: Besides examining Jentink's type, I have before me for study a good series from the Fly River: mouth of Black River, six; mouth of the Palmer River, three (one more in alcohol); Oroville Camp, four; middle Fly River, three; Lake Daviumbu, seven; Sturt Island Camp, three; Gaima, one; Wuroi, one; Daru, one; Hollandia, on the north coast, four (in alcohol, A.M.N.H. Nos. 152842-152845), consisting of a partly grown male and a fully adult female with two young. The hind foot of the female measures 32.5 mm. (s.u.); the tail, ± 150 mm.

Dorsal color of the type brownish gray; ventral color creamy white, the hair bases white. Vibrissae, 69 mm. Tail fuscous above and beneath. Tail scales 13 per centimeter, rugose but not keeled, slightly longer than broad. Scale hairs one per scale, two-thirds of one scale length. Foot gray, heavily built, with strong claws. Ears rather small. Skull strongly ossified, with short rostrum, well-marked temporal ridges, broad, nearly upright zygomatic plate, orthodont incisors, small bullae.

[***Melomys leucogaster latipes* Tate and Archbold]**

Melomys latipes TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 3.

TYPE: A.M.N.H. No. 104273, young adult, from Baroka, Mekeo District, Central Division, Papua, near sea level, collected April 11, 1933, by R. Archbold.

MATERIAL: Kokebagu, Kemp Welch River, nine; Sogeri, two; Mt. Gayata, Richardson Range (C.N.H.M. No. 8360), one.

Possibly synonymous with true *leucogaster*.

***Melomys arcium* (Thomas)**

Uromys arcium THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 214.

TYPE: B.M. No. 89.6.3.2, adult female, from Rossel Island, D'Entrecasteaux group, eastern end of New Guinea, collected by Basil Thompson.

This unique specimen was skinned from alcohol. The present dorsal color is dull brown with some of the hairs orange brown; the ventral pelage is dull buffy white, without gray bases. The tail is fuscous, the scales raised and shield-like, 12 to 13 per centimeter, the scale hairs one per scale and one-half to three-fourths of one scale in length. The hind foot is of scansorial type, its width at the base of the fifth metatarsal 5 mm.

The skull is built much as that of *leucogaster*; it is considerably larger than that of any race of *rufescens*. The width of the rostrum is 6.3 mm.

***Melomys fulgens* (Thomas)**

Uromys fulgens THOMAS, 1920, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 426.

TYPE: B.M. No. 20.7.26.20, adult male, from Teloeti Bay, south Ceram, west of New Guinea, sea level, collected February, 1920, by the Pratt brothers.

Related to *leucogaster*. The skin of the type bright orange brown; the ventral hairs self-colored creamy white. Hairs of hands and feet white. Tail black; very slightly paler beneath. Tail scales 13 per centimeter, longer than wide, raised. Tail hairs one per scale, one-third of one scale length. Width of hind foot at fifth metatarsal, 5.9 mm.

The strongly arched skull has the rostrum short and broad (width 7 mm.). Zygomatic plate well thrown forward, straight-edged.

ON ***Melomys caurinus* AND *Melomys talaudium***

The two types, still unique, were described by Thomas the same year. Both came from the Talaud Islands. They were singularly alike, and both are adult females. Like *Melomys fulgens*, these specimens differ from the otherwise closely related *M. leucogaster* by their orange brown coloration. Ellerman believed them synonymous.

The width of the hind foot at the base of the fifth metatarsal is 5.8 mm. (in *talaudium*, 5.5). The number of tail scales in both is 13 per centimeter, and the scales are rounded and raised. In *caurinus* the scale hairs are one per

scale, in *talaudium* three per scale; this is the only significant external character in which the two differ. The hair lengths vary from two-thirds of one to one scale length.

The skulls are well arched and have short rostra; the rostrum of *caurinus* is broken; the width of that of *talaudium* is 6.3 mm. The zygomatic plate is well thrown forward in *caurinus*; low and broad in *talaudium*. In both m^2 is broader than m^1 .

Melomys caurinus Thomas

Melomys caurinus THOMAS, 1921, Treubia, vol. 2, p. 112.

TYPE: B.M. No. 21.2.9.2, adult female, from the Talaud Islands, received from Buitenzorg Museum, Java, collected September 17, 1917.

Dorsal color of type dark brownish gray; ventral color creamy white, with the hair bases white. Tail fuscous above and beneath. Feet gray. Tail scales 13 per centimeter, one hair per scale, hairs two-thirds of one scale length. Scales rugose but not keeled.

Skull with short rostrum, pronounced temporal ridges, incipient temporal processes, wide interparietal, broad, nearly upright zygomatic plate, and short incisive foramina.

Melomys talaudium (Thomas)

Uromys talaudium THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 7, p. 248.

TYPE: B.M. No. 21.2.9.3, adult female, from Liroeng, Talaud Islands, received from Buitenzorg Museum, Java, collected April 13, 1916.

Dorsal color of type bright orange brown; ventral color self-colored buff. Hands and feet buff. Tail dark beneath as well as above. Scales well raised, 13 per centimeter, two-thirds of one scale length, scale hairs three per scale.

Skull with short, broad rostrum, nasals scarcely exceeding the premaxillae, zygomatic plate low and broad.

The continuance of three hairs per scale may indicate a persistent ancestral character in a group in which the hairs are normally reduced to one per scale.

UROMYS PETERS

Uromys PETERS, 1867, Monatsber. K. Preussischen Akad. Wiss. Berlin, p. 343.

Gymnomys GRAY, 1867, Proc. Zool. Soc. London, p. 597.

Cyromys THOMAS, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 507.

Solomys THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 261.

Unicomys TROUGHTON, 1935, Rec. Australian Mus., vol. 19, p. 259 (as a subgenus; see below).

TYPES: Of *Uromys* and *Gymnomys*, *Mus macropus* Gray (= *Haplotis caudimaculatus* Krefft). Of *Cyromys*, *Mus imperator* Thomas. Of *Solomys*, *sapientis*.

Large, mosaic-tailed rats derived, possibly, from the ancestors of the *leucogaster* group of *Melomys*. Tail usually longer than the body; feet of markedly scansorial type. Scale hairs invariably reduced to one per scale. Pelage, with the exception of that in *Unicomys*, rather short, dense, and relatively coarse.

Skull massive, with uninflated braincase, interorbital area narrow, strong supraorbital ridges, more or less pronounced postorbital prominences. The palate short, the back of same either Ω -shaped or Λ -shaped, except in *Unicomys*. Incisive foramina short. Bullae small to very small; incisors massive, and molars with patterns extremely simplified, consisting of almost unmodified transverse lophs similar to those of *Melomys*.

The genus can be divided into three main categories on both structural and geographical bases, as follows:

1. *Uromys* of typical character, found throughout the lowlands of New Guinea and some of its outlying islands and in the northeastern parts of Australia.

2. *Uromys* of exceptionally large size, found among the high mountains of New Guinea and New Britain.

3. *Uromys* of aberrant character, occurring in the Solomon Islands.

Despite the large numbers of names that have been applied to them at various localities, I have become convinced that all the lowland and foothill *Uromys* of New Guinea and Australia are either conspecific or at the most members of a single species group. They include:

<i>caudimaculatus</i> Krefft	Cape York Peninsula,
	Queensland
<i>sherrini</i> Thomas	Atherton Tableland,
	Queensland
<i>exilis</i> Troughton and LeSouef	Hinchinbrook Island,
	Queensland

<i>validus</i> Peters and Doria	Katau, south New Guinea
<i>aruensis</i> Gray	Aru Islands
<i>papuanus</i> Ramsay	—
<i>ductor</i> Thomas	Avera, Aroa River
<i>prolixus</i> Thomas	Haveri, Astrolabe Range, 700 feet
<i>siebersi</i> Thomas	Kei Islands
<i>multiplicatus</i> Jentink	Sentani Lake, north New Guinea
<i>scaphax</i> Thomas	Lower Setakwa River, 150 feet
<i>waigeuenis</i> Frechkop	Waigeu Island north of Vogelkop
<i>nero</i> Thomas	Utakwa River, 2500 feet
<i>lamington</i> Troughton	Lamington District, Northern Division, Papua

The mountain-dwelling *Uromys* are of greater size than the *caudimaculatus* group. They comprise a single species, *anak*, in New Guinea and an even larger species in New Britain, *neobritannicus*.

The species of the Solomon Islands seem to indicate that separate colonizations took place at various times in the past during the period when the *caudimaculatus* and *anak* groups were becoming established. The shortness of the tail shown by *imperator* and *porculus* may be secondary. This group is discussed separately beyond.

In an earlier study (Tate, 1936, p. 600), I suggested that *Uromys* was divisible into two main groups: the Papuan mountain forms, with *neobritannicus*, and the Papuan lowland forms, with the Australian races. With much more material to study I am still of the same mind, with few exceptions. One exception is *Mus barbatus* Milne Edwards, the type of which I have since seen in Paris. That animal is referable to *Xenuromys*. It should be noted that *Xenuromys* is not a mosaic-tailed rat. Its tail scales are as completely imbricated as those of *Rattus* or of *Anisomys*. Though it probably branched off the stem leading to *Uromys*, it merely resembles *Uromys* superficially, just as does *Anisomys*.

THE *Uromys caudimaculatus* GROUP

Rümmeler (1938) and Ellerman (1941) treat their "*caudimaculatus* group" [= *anak* plus all lowland "species" (of Thomas) of New Guinea and Australia] as comprising two

species only: *anak* and *caudimaculatus*. They synonymize all New Guinea forms with *validus* and make *validus* itself a race of *caudimaculatus*. In addition, they maintain *sherrini*, *aruensis*, and *siebersi* as distinct races of *caudimaculatus* having a rank equivalent to that of *validus*.

It is plain from their measurements that there is a moderate degree of variability in Papuan *Uromys* in both the skin and the skull; the color of the pelage is quite variable. But taken as a whole they are very similar to each other. This total Papuan aggregate differs consistently from the Australian *Uromys* by its shorter muzzle, expressed by the length of the diastema, and its generally smaller teeth. A large member of the Australian group (A.M.N.H. No. 108952) may be almost as large as *U. anak*.

In the Idenburg River series, the upper Fly River series, and the Astrolabe Mountains series, all of which come from rain-forest areas, the color of the pelage tends to be relatively deep and rich, and the hair glossy. On the contrary most of the animals from the sun-drenched Cape York Peninsula, even though forest dwellers, have light gray-brown pelage which gives the appearance of being partly faded. Some Australian *Uromys* from rain-forest areas such as Iron Range are nearly as richly colored as the Papuan ones. Both molt and fading may play parts in such cases. The young of all can be recognized immediately by their softer, grayer, less glossy fur.

I do not think that the present group can be divided into more than one full species, despite the large number of forms that have been named. This full species comprises three subspecies.

Uromys caudimaculatus (Krefft)

This is a midmontane to sea-level species, represented in Australia by one race and in New Guinea by two: *aruensis* from south of the central chain of mountains, *multiplicatus* from north of it.

KEY TO THE RACES OF *Uromys caudimaculatus*

1. Size of adults very large; hind foot, 60 to 67 mm.; nasals, 22 to 27; tail with one-half to two-thirds of end white . . . *caudimaculatus*
Size of adults smaller; hind foot, 55 to 62 mm.; nasals, 21 to 24 mm. 2

2. Tail usually with only 1 to 2 inches of the tip white *aruensis*
 Tail usually with one-third to one-half of terminal part white *multiplicatus*

***Uromys caudimaculatus caudimaculatus* (Krefft)**

Mus macropus GRAY, 1866, Proc. Zool. Soc. London, p. 221 (preoccupied).

Hapalotis caudimaculatus KREFFT, 1867, Proc. Zool. Soc. London, p. 316.

Uromys caudimaculatus sherrini THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 2, p. 171.

Uromys macropus exilis TROUGHTON, 1929, Australian Zool., vol. 6, p. 98.

TYPES: Of *macropus*, adult female, B.M. No. 66.4.23.6, from Fort Albany, tip of Cape York Peninsula. Of *caudimaculatus*, Australian Museum, Sydney, No. S.1848, skull only, from "Cape York." Of *sherrini*, B.M. No. 22.12.18.9, adult female, from Dinner Creek, Ravenshoe, Atherton Tableland, 2900 feet, collected May 5, 1922, by T. V. Sherrin. Of *exilis*, Australian Museum, No. M.4378, adult female, from Hinchinbrook Island, near Cardwell.

MATERIAL: Northeastern Australia: Somerset, one; Lockerbie, five; Red Island Point, one; Newcastle Bay, one (all three places approximately topotypical); Portland Roads, one; Iron Range, seven; Mt. Tozer, near the foot (about latitude 12° S.), four; Coen, three; Peach River, eight (three more in M.C.Z.); upper Nesbit River, one; Port Stewart, one (all four places about latitude 14° S.); Shipton's Flat, 30 miles south of Cooktown, one; Bloomfield River (Sydney Museum), one; Mt. Spurgeon, six (one more in M.C.Z.); Mossman Gorge, two; Barron Waters, Cairns, one; Wongabel (C.N.H.M.), three; Speewah, three; Danbullan (C.N.H.M.), one; Millaa Millaa (M.C.Z.), one; Lake Barrine (M.C.Z.), three; Walter Hill Range, three; Russell River, one; Herberton area (M.C.Z.), one; Bellenden Ker (Sydney Museum), one (all in Cairns-Atherton Tableland area, the type area for *sherrini*); Hinchinbrook Island (Sydney Museum, type locality of *exilis*), one. Total, 66.

At Mt. Speck, west of Townsville, I was told about a large rat, larger than *R. assimilis*, with the tip of the tail white, which I assumed was *Uromys*, though it might have been *Hydromys*.

This race is characterized by its great

size, rather coarse long hair, with generally three-fifths of the tail white, large tail scales (in fully adult animals), large feet, elongate skull, in which m^3-3 are considerably larger than in the New Guinea races. The width of the hind foot in *sherrini* at the base of the fifth metatarsal is 10.0 mm.

The great wealth of specimens before me (in comparison with collections worked upon in the past) leads me to the view that *sherrini*, and probably *exilis* too, can no longer be maintained as distinct races. Both were based upon females, adult but not fully grown, and the ways in which the types of these races differ from *caudimaculatus* and from each other represent differences of age, sex, and season. Actually I can find among females of true *caudimaculatus* specimens that exactly match in dimensions and other characters some of those of *sherrini*, and among males of *sherrini* I can equally well match the big males of *caudimaculatus*.

Apparent differences of color in this case are functions of molt and season. Newly molted individuals may be almost rusty in color. This rusty color gradually fades through bleaching and wear to the usual light brownish gray. Very young animals normally have a soft gray pelage.

The range of the species includes the whole of the eastern side of Cape York (possibly much of the west too, but I have no evidence), southward through the rain-forested part of the Atherton Tableland and the coastal strip between it and the sea, as far south as latitude 19° S. There is no information on *Uromys* beyond the dry area southeast of Townsville, though it may later be found in the rain forests behind Mackay.

***Uromys caudimaculatus aruensis* Gray**

Uromys aruensis GRAY, 1873, Ann. Mag. Nat. Hist., ser. 5, vol. 12, p. 418.

Uromys validus PETERS AND DORIA, 1881, Ann. Mus. Civ. Genova, ser. 1, vol. 16, p. 703.

Hapalotis papuanus RAMSAY, 1883, Proc. Linnean Soc. New South Wales, vol. 8, p. 18.

Uromys nero THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 208.

Uromys scaphax THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 209.

Uromys prolixus THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 213.

Uromys ductor THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 213.

Uromys siebersi THOMAS, 1923, Treubia, vol. 3, p. 422.

TYPES: Cotypes of *aruensis*, B.M. Nos. 72.3.5.2, 72.3.5.3, female and male, from Aru, collected by A. B. Meyer, April, 1870. Of *validus*, Genoa Mus. No. C.E. 3248, a juvenal male in alcohol, the skull apparently lost (made into a skin in 1937), from Katau, mouth of Fly River, collected by D'Albertis. Of *papuanus*, probably in Australian Museum, Sydney. Of *nero*, B.M. No. 13.6.18.13, adult female, from Camp No. 3, Utakwa River, 2500 feet, collected by C. B. Kloss, December 15, 1912. Of *scaphax*, B.M. No. 13.6.18.8, adult female, from Canoe Camp, lower Setakwa River, 150 feet, collected October 25, 1912, by C. B. Kloss. Of *prolixus*, B.M. No. 97.8.7.67, adult male, from Haveri, 2000 feet, Astrolabe Range, collected by L. Loria. Of *ductor*, B.M. No. 3.12.1.4, adult male, collected by A. S. Meek from Avera, Aroa River. Of *siebersi*, B.M. No. 23.4.3.12, adult male, from Gunung Daab, Great Kei, sent in by Buitenzorg Museum.

MATERIAL: Wassi Kussa, four; Daru Island, one; Dogwa, Oriomo River, 18; Sturt Island Camp, Fly River, 31; Lake Daviumbu, Fly River, five; headwaters of the Fly River, six; Astrolabe Range, eight.

Uromys c. aruensis, with its numerous synonyms, can be taken to occupy the whole of New Guinea south of the Central Range.

The tail normally has only the terminal 1 or 2 inches white. In a few examples from the Astrolabe Range about one-third is white. The size of the animals is markedly smaller than that of the Cape York race of *caudimaculatus*. The width of the hind foot at the base of the fifth metatarsal is: (*aruensis*), 10.8 mm.; (*nero*), 10.0; (*scaphax*), 8.0; (*prolixus*), 11.5; (*ductor*), 10.0; (*siebersi*), 8.5.

Previously authors have applied the name *validus* to this south New Guinea race, leaving *aruensis* as a distinct island race. The fairly well-ascertained former connection of the Aru Group of islands with the mainland and the identity of many, if not all, of its races of rodents and marsupials with south New Guinea forms induces me to synonymize *validus* with the older *aruensis*.

Owing to the variability of this species

of *Uromys*, the case for synonymizing the various *Astrolabe* races is not quite so clear, although there is little to be said in favor of keeping them apart.

It seems likely that the juvenal recorded from Fergusson Island by Thomas (1896) belonged with this race or the next.

Uromys caudimaculatus multiplicatus Jentink

Uromys multiplicatus JENTINK, 1907, Nova Guinea, vol. 5, p. 367.

Uromys waigeuensis FRECHKOP, 1932, Bull. Mus. Roy. Hist. Nat. Belgique, vol. 8, no. 28, p. 11.

Uromys lamington TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 126.

TYPES: Of *multiplicatus*, Leiden (no number), juvenal male, collected by the Wischman expedition, April 18, 1903, at Sentani Lake (a flat skin). Of *waigeuensis*, not seen. Of *lamington*, Sydney, No. M.4684, adult male, from Mt. Lamington District, southern border of Northern Division of Papua, collected by C. T. McNamara, 1929.¹

The type of *multiplicatus* is colored dark brownish gray; the ventral color is creamy white, without gray bases to the hairs. The terminal one-third of the tail is white. The skull has the back of the braincase broken. The first and second molars are typical *Uromys* teeth showing virtually no wear, and m_3^1 are not erupted.

I know *waigeuensis* only from the description. The type of *lamington* is tawny, grizzled with a mixture of ochraceous buff body hairs and blackish guard hairs. Under parts yellowish ivory. Troughton believed the skull shorter and broader than the "allied species." It appears to me a rather young animal. This eastern form may represent a continuance of the *aruensis* race around the eastern end of Papua instead of the northern race.

MATERIAL: Idenburg River, 50 to 75 meters, six; 850 meters, 10; 1200 meters, four. All these specimens have much more black in the dorsal coloration than is seen in south New Guinea or Australian material. The tails, like the tails of *aruensis*, are considerably shorter than those of true Australian *caudimaculatus*. They differ from south

¹ A large part of the Lamington District has been destroyed by a recent volcanic eruption.

New Guinea material by having from one-third to one-half of the distal part of the tail white.

THE *Uromys anak* GROUP

Giant rats of the genus *Uromys* confined to the mountains of New Guinea and to New Britain. They are distinguished from the lowland *aruensis* (south) and *multiplacatus* (north) by their greater size, far more massive teeth and skulls, and completely black tails.

Uromys anak Thomas

Uromys anak THOMAS, 1907, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 72.

Uromys rothschildi THOMAS, 1912, Novitates Zool., vol. 19, p. 91.

TYPE: Of *anak*, B.M. No. 7.5.22.2, adult male, Efogi, Brown River, Papua, ± 4000 feet, October 2, 1906, collected by C. A. W. Monckton. Of *rothschildi*, B.M. No. 12.1.31.2, adult female, Rawlinson Mountains, northwest Huon Peninsula, collected by C. Keyser. The back of the skull is missing in both types.

MATERIAL: Western Netherlands New Guinea: Weyland Mountains, one; central New Guinea: Bele River, 2200 meters, 11; 9 kilometers northeast of Lake Habbema, 2800 meters, one; mountains south of the Idenburg River, 2150 meters, two; lower slopes adjoining the Idenburg, 850 meters, one; Papua: Mt. Tafa, 7400 feet, one. Total, 17.

Upper parts gray-brown, with black guard hairs. Nape brown, crown blackish, hands and feet black. Under parts buff to the roots (in parts a trace of gray at the roots). Tail without white tip. Width of hind foot at base of fifth metatarsal, 12 mm. Tail scales 12 per centimeter, wider than long, scale hairs one per scale, one scale length.

Skull with slight frontal depression, incipient temporal processes. Incisors slightly proodont.

The label of the type of *anak* was marked "a ground animal, lives in burrows and sometimes in the hollow of a leaning tree."

The number of specimens seems to indicate that the altitudinal mean for this giant rat is between 6000 and 7000 feet. However, as it occurs as low as 2500 feet and as high as 8500 feet, this may mean merely that more

intensive collecting was done in the Bele River basin. Obviously it ranges throughout the main mountain system, including the Huon Mountains (*rothschildi*). Its presence has not yet been demonstrated in the Arfak Mountains.

Uromys neobritannicus Tate and Archbold

Uromys neobritannicus TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 4. TATE, 1936, Bull. Amer. Mus. Nat. Hist., vol. 72, p. 605.

TYPE: A.M.N.H. No. 99881, adult male, skull only, collected in New Britain, 1933, by W. F. Coultas.

MATERIAL: New Britain (Ositokara), Tala-sea, collected by Father Schumm (A.M.N.H. No. 119467, male), one.

It is very gratifying to report the receipt of this second specimen of the giant *Uromys* of New Britain. The skin differs strikingly from that of the *Uromys* of the mainland in being strongly rufescent, with dark brownish gray hair bases and the guard hairs shining buffy yellowish. The nape and the crown of the head are strongly reddish. The ears and tail are fuscous. The under parts are deep dull yellow. Scale rings of the tail six to seven per centimeter. The claws are long and strong as in Papuan mountain *Uromys*.

The skull, though somewhat younger, matches that of the type very closely, the postorbital processes being very slightly less prominent and the width across them only 25.4 mm. (27.0 mm. in the type). The palate and dentition match exactly (m^{1-3} , 13.0 mm.). The audital part of the skull is broken away and missing.

THE LARGE *Uromys*-LIKE RATS FROM THE SOLOMON ISLANDS

Seven names have been applied to large rats of the Solomons. Presented in geographical order from west to east, they are:

<i>Unicomys ponceleii</i>	Bougainville
<i>Solomys salebrosus</i>	Bougainville
<i>Solomys sapientis</i>	Santa Ysabel
<i>Uromys porculus</i>	Aola, Guadalcanar
<i>Cyromys rex</i>	Aola, Guadalcanar
<i>Cyromys imperator</i>	Aola, Guadalcanar
<i>Mus salamonis</i>	Ugi, north of San Cristobal

The slightly smaller "*Melomys*" (Rümmeler) *porculus* from Aola, Guadalcanar,

should in my opinion be included. The American Museum of Natural History possesses three specimens from Choiseul, formerly marked *solomonis*, which appear referable instead to *salebrosus* or *sapientis*. It seems likely that intensive trapping would reveal *Uromys*-like rats on all the larger islands. None has yet been discovered on Malaita, but no fewer than three (*rex*, *imperator*, and *porculus*) were obtained by C. M. Woodford on Guadalcanar. Woodford indicated on the specimen labels that *rex* and *imperator* were, respectively, arboreal and terrestrial. The proportionately very short tail of *imperator* may be related to this observation. The tails of *salebrosus* and *porculus* are likewise short. In *salamonis* the tail and head-plus-body are equal. Other Solomon Islands species have the tail somewhat longer than the head and body. In my earlier paper (Tate, 1936) I synonymized *sapientis* with *salamonis*. This I now think was a mistake because of the difference in size of the bullae.

Frechkop (1948) has followed Rümmler (1938) in placing *Solomys* in *Melomys*. In my view it diverges but little from true *Uromys*.

The very large *Uromys ponceleti* appears set off from the other forms, though not on a generic level. The measurements that I made of Troughton's three skulls show a high degree of conformity with one another. Only the body measurements in my table (table 5) are copied from Troughton's published data. The very long tooth row (13.5 to 13.9 mm.) is approached only by that of *Cyromys imperator* (12.0 mm.).

Conversely, *porculus* and *salamonis*, with foot lengths of only 43 and 44.5 mm., respectively, are distinctly smaller than any other species. Coming from nearly adjoining islands, it is possible that they are quite closely related. The skull of *porculus* is somewhat more slender than that of *salamonis*. The teeth and other skull characters are substantially alike.

The three forms *Solomys salebrosus*, *Solomys sapientis*, and *Cyromys rex*, with foot lengths of from 46 to 55 mm. and tooth rows, 10.4 to 11.3 mm., may possibly constitute a single species of relatively wide distribution through the Solomon Islands.

The short-tailed, large-sized *Cyromys im-*

perator, with foot length 64 mm., tooth row 12 mm., and broad zygomatic plate (7.4 mm.), should be maintained as a full species.

Four full species thus remain:

ponceleti
imperator
sapientis+*rex*+*salebrosus*
salamonis+*porculus*

So far as can be determined, all have the mammary formula 0-2=4, all have tails with scales of "mosaic" type and scale hairs of minute size reduced to one per scale, and all have skulls and teeth of general *Uromys* character, and short incisive foramina.

Lacking other evidence, it becomes a matter of individual preference whether to name all species *Uromys*, to retain certain of the old generic terms as subgenera, or yet to sustain their distinction as full genera. In the present work I have taken a middle course: I have kept *Uromys* as a subgeneric unit and have treated the remaining Solomon Islands giant rats as species of *Uromys*.

All these animals are so rare in collections that I have given rather detailed new descriptions of the type of each species and have compared their measurements. They are shown in the foregoing list in the geographical order of their localities from west to east.

Uromys sapientis (Thomas)

Solomys sapientis THOMAS, 1902, Ann. Mag. Nat. Hist., ser. 7, vol. 9, p. 446.

TYPE: B.M. No. 2.5.1.4, adult male, Santa Ysabel, Solomon Islands, July 6, 1901, collected by A. S. Meek.

Pelage of type uniformly gray brown; under parts brownish buff. Tail without white. Hands and feet grayish white. Width of hind foot at base of fifth metatarsal, 8.7 mm. Tail with scales eight to nine per centimeter (stretched), scales strongly raised and pointed; scale hairs one per scale, three-fourths of one scale length.

Skull shorter and broader than in most *Uromys*, and with longer bullae. Back of palate with V-shaped notch. Back of brain-case proportionately wide.

Another rat from Santa Ysabel (No. M.3492), adult female, is in the Australian Museum, Sydney. It appears to be very like *sapientis* but its interorbital region is nar-

rower; zygomatic plate slightly narrower; incisive foramina wider, especially in front; interpterygoid fossa narrower; bullae larger and more prominent beneath; incisors deep orange.

Uromys salebrosus (Troughton)

Solomys salebrosus TROUGHTON, 1936, Rec. Australian Mus., vol. 19, p. 346.

COTYPES: Sydney Nos. M.5590, male, holotype, and M.5789, female, from Bougainville, Solomon Islands.

The male is extremely like *salamonis* of Santa Ysabel, except that in it m^1 and m^2 are wider. The allotype has a mesopterygoid fossa narrow as in "*sapientis*" (No. M.3492), and the bullae are small, as in that specimen. Of the paratypes, No. M.5762 is a rather larger specimen; No. M.5763 has molars with proportions similar to those of "*salamonis*."

Frechkop (1948), who had four specimens from Bougainville, made *salebrosus* a full synonym of *sapientis*.

Uromys rex (Thomas)

Mus rex THOMAS, 1888, Ann. Mag. Nat. Hist., ser. 6, vol. 1, p. 157.

TYPE: B.M. No. 88.1.5.34, adult male, Aola, Guadalcanar, collected by C. M. Woodford.

Pelage of type coarse, rather dense, grayish brown; under parts self-colored dull white. Width of hind foot at base of fifth metatarsal, 13 mm. Tail scales small, well raised, eight per centimeter, scale hairs one per scale, one-fourth to one-half of one scale length. Also three paratypes in alcohol, B.M. Nos. 88.1.5.35-88.1.5.37, one male, two females. Mammae, 0-2=4. Skull with the zygomata broadened as in *Solomys*; palate rounded at the back and with only a suggestion of a median spine, as in *Uromys*; bullae small; temporal processes well developed; molars short and broad; incisors orthodont.

A second male, also secured by C. M. Woodford (Genoa, No. C.E.3459), is much like the type. Length of hairs of dorsal pelage, 17 to 20 mm. Color grayish brown, under parts buffy self-colored. Feet yellowish (in spirit) and their pads very large. Tail scales tubercle-like, small, one-haired, the hairs three-fourths of one scale length.

Skull essentially like that of Papuan

Uromys. Rostrum short and heavy; supra-orbital ridges extending straight back on parietals but not prominent; postorbital processes moderate; incisive foramina with three-fourths of their length in the premaxillae; back of palate rounded, not V-shaped, even with m^3 ; no posterior spine; bullae small and flat; teeth moderately worn.

Uromys imperator (Thomas)

Mus imperator THOMAS, 1888, Ann. Mag. Nat. Hist., ser. 6, vol. 1, p. 157.

TYPE: B.M. No. 88.1.5.33, young female in alcohol, from Aola, Guadalcanar, Solomon Islands, collected by C. M. Woodford.

Also a male paratype, B.M. No. 88.1.5.32, in which the length of the foot (s.u.) is 65 mm., and the width of the foot at the base of the fifth metatarsal is 14.5.

The type is grayish brown, with the underparts self-colored buffy white. Width of ear, 18 mm. Feet and hands dull white. Width of hind foot at base of fifth metatarsal, 14 mm. Tail scales small, rounded, moderately raised, 10 per centimeter, scale hairs one per scale, about one scale length. Mammae, 0-2=4.

Skull, as in *rex*, with well-developed paroccipital processes; interparietal narrow; temporal processes well developed; skull longer and narrower than in *rex*; m^1 broader than in *rex*.

Uromys porculus Thomas

Uromys porculus THOMAS, 1904, Ann. Mag. Nat. Hist., ser. 7, vol. 14, p. 400.

TYPE: B.M. No. 89.4.3.8, adult male, from Aola, Guadalcanar, Solomon Islands, collected by C. M. Woodford.

I know of no specimen other than the type, which was skinned from an alcohol specimen. Rümmler (1938) placed it in *Melomys* between *lutillus* and *obiensis*. Ellerman (1941) has it in his system between *Solomys sapientis* and *Melomys lutillus*.

The pelage is coarse, its color now brownish gray, the under parts are yellowish buff, with the hair bases gray, hands and feet buff, the quite short tail fuscous above and beneath. The tail scales are 16 per centimeter, wider than long, with strongly raised surfaces, and each is subtended by a single hair of one to one and one-fourth scale lengths.

The heavily built skull has the muzzle

very broad (8.6 mm.), the braincase narrow, with incipient temporal processes, the bullae small, the anterior palatal foramina rounded at each end.

When Thomas (1922) segregated *Melomys* from *Uromys* he placed *porculus* with the former. Rümmler, Ellerman, and I myself have held to this arrangement hitherto, even though *porculus* by reason of its large size and massive skull was markedly atypical. Now I am disposed to place it instead among the other *Uromys*-like rats of the Solomons, for, though it is one of the smallest of those, certain of its measurements (interorbital breadth, nasals, zygomatic plate, and incisive foramina) more readily conform with those of *Solomys*.

Uromys salamonis (Ramsay)

Mus salamonis RAMSAY, 1883, Proc. Linnæan Soc. New South Wales, vol. 7, p. 43.

TYPE: Sydney, No. A.11257, adult male, from Ugi Island, north side of San Cristobal, Solomon Islands.

I saw only the skull, which has the tips of the nasals broken.

Muzzle of type stout; temporal ridges subparallel and not approximated at the orbits, slightly spreading behind on the parietals; temporal processes incipient, interparietal broad; zygomatic arches widest behind; zygomatic plate high and straight; mesopterygoid fossa rather wide; a weak posterior palatal spine; bullae small, projecting downward only slightly. Molars heavy.

UROMYS, SUBGENUS UNICOMYS TROUGHTON

Unicomys TROUGHTON, 1935, Rec. Australian Mus., vol. 19, p. 259.

TYPE: *Unicomys ponceleti* Troughton.

Troughton proposes *Unicomys* as a full genus, and possibly it should remain at that level of classification. But Rümmler (1938, p. 171) synonymized it with *Solomys*, which he considered to be a subgenus of *Melomys*, and Ellerman (1941) followed Rümmler without comment. Neither author had examined a specimen. Certainly *Unicomys* is a spectacular "giant rat," with its long, almost shaggy coat, but I found it undoubtedly belonged to the *Uromys* group and could perceive no characters of generic importance.

Uromys (Unicomys) ponceleti Troughton

Unicomys ponceleti TROUGHTON, 1935, Rec. Australian Mus., vol. 19, p. 260.

TYPE: Sydney, No. M.5756, adult female in alcohol (skull cleaned), from the south side of Bougainville, Solomon Islands, collected by Father Poncelet.

The skin of the type is characterized by exceedingly long body hair which extends partly onto the tail. Ear small, compared with that of *Uromys*; tail scales small; scale hairs three-fourths to one scale length, one per scale. Width of foot at base of fifth metatarsal, 14.6 mm. Foot length, 72.0 mm. Mammæ, 0-2=4, quite small for the *Uromys* group; the specimen may be virgin.

Skull heavy, with stout rostrum and depressed frontals. Interorbital region narrow; temporal processes incipient; interparietal wide; zygomatic plate high and straight; malar heavy; post-palatal spine pronounced; bullae small; molars broad and heavy; incisors deep orange (see Troughton's photographs).

There are two other specimens of this interesting species at Sydney, and Frechkop (1948) records four more from Buin.

POGONOMELOMYS RÜMMLER

Pogonomelomys RÜMMLER, 1936, Zeitschr. f. Säugetierk., vol. 2, p. 248 (as a subgenus); 1938, Mitt. Zool. Mus. Berlin, vol. 23, p. 166. TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 5 (as a genus).

TYPE: *Melomys mayeri* Rothschild and Dollman.

Pogonomelomys was first introduced as a subgenus of *Melomys*. The characters given by Rümmler, its author, did not include the upwardly prehensile end of the tail. After studying freshly killed *P. bruijnii*, race *brassi*, in the upper Fly River area, we were able (Tate and Archbold, 1941) to add this character and raise *Pogonomelomys* to full generic rank. Further study of the remaining species reveals an area of tactile skin on the dorsal surface of the tip of the tail in the other forms.

Ellerman at first (1941, p. 226) denied *Pogonomelomys* even subgeneric rank but later (1949, pp. 26, 89) granted it a position as a full genus. Hinton (1943) also studied the material.

Pogonomelomys remains an unsatisfactory genus due to the fact that it seems to be diphyletic or even triphyletic. The form *mayeri*, for which it was originally named, has an arrangement of the tail scales and their scale hairs different from that of the much smaller *sevia*, *rümmeleri*, and *tatei* or the larger, long-tailed *bruijnii*. Also *P. fraterculus* of Ceram appears to be anomalous. Against these differences, all named species are found in high country, and all are united by the common bonds of *Melomys*-like teeth and upwardly prehensile tails.

Pogonomelomys mayeri has the outward appearance of *Melomys levipes lorentzii*, but the scale hairs are large, hexagonal, and each has three very short hairs. The skull is broad, and its rostrum is rather short.

Pogonomelomys bruijnii is larger and has the external facies of *Melomys leucogaster*, though the tail is longer. The tail scales are of the mosaic type, rather large and slightly sculptured. Their hairs are reduced to one per scale. The short, broad skull is much like that of *M. leucogaster*.

Pogonomelomys sevia, *tatei*, and *rümmeleri* are in some ways similar to the new member of the *Melomys lutillus* group, *M. frigidicola*, but the scale hairs are almost as unreduced as those of *Rattus browni*. The teeth are *Melomys*-like, and the tip of the tail is upwardly prehensile as in other *Pogonomelomys*. I have followed Rümmler in placing *M. fraterculus* of Ceram with *Pogonomelomys*. Its scale hairs agree in character with those of the *rümmeleri* group. The scales are 14 per centimeter, the hairs one and one-half scale lengths and three per scale.

Provisionally I separate *Pogonomelomys* into two groups.

KEY TO THE GROUPS OF *Pogonomelomys*

- Large scansorial species of midmontane or lowland habitat in western New Guinea *mayeri-bruijnii* group
- Small, less scansorial species of highland habitat in central New Guinea and the mountains of the Huon Peninsula . . . *sevia-rümmeleri* group

THE *Pogonomelomys mayeri-bruijnii* GROUP

Pogonomelomys mayeri (Rothschild and Dollman)

Melomys mayeri ROTHSCILD AND DOLLMAN, 1932, Proc. Zool. Soc. London, p. 1082.

COTYPES: Tring (field nos. S.M. 158, 179, 182), from Gebroeders, Weyland Range, west Netherlands New Guinea, 5000 feet, collected August 17, 1930, by F. Shaw Mayer.

MATERIAL: From the Weyland Range, 5000 feet, five paratypes; from Bernhard Camp, Idenburg River, 400 meters (A.M.N.H. No. 152364), a single specimen.

The cotypes are rather large, *Melomys*-like in form, with soft, reddish brown fur mixed with some fuscous guard hairs. The under parts are white to the roots of the hairs. Tail scales (illustrated in Tate, 1936, fig. 22, F) rather large, 11 per centimeter, scale hairs very short, about one-fourth of one scale length, three per scale.

Skull with short, massive rostrum; full braincase with well-developed supraorbital ridges; large interparietal, short, wide, incisive foramina, wide mesopterygoid fossa, short nasals. Zygomatic plate very straight and scarcely thrown forward. Tooth row moderately elongate.

Pogonomelomys bruijnii (Peters and Doria)

Uromys bruijnii PETERS AND DORIA, 1876, Ann. Mus. Civ. Genova, vol. 8, p. 336.

TYPE: Genoa, No. C.E.3677, adult female, from Salawatti, northwest of Vogelkop, collected by Bruijn.

The type of *bruijnii* is labeled "*= U. cervinipes* Gould," an obvious error. It is a fully adult animal, the teeth showing much wear. The dorsal color is now reddish and somewhat like that of *M. lorentzii*. The hairs of the dull white under parts apparently lack gray bases. Mammæ, 0-2=4. Tail long, its scales as wide as long (almost 1 mm. in length); scale hairs three per scale and one-third to one-half of one scale length. Hind foot heavy, scansorial, about 34 mm. in length, its width at the base of the fifth metatarsal, 5.5 mm.

Skull, as in *P. mayeri*, broad and heavy, the incisive foramina short and broad; muzzle rather short; supraorbital ridges well developed; mesopterygoid fossa exactly as in *mayeri*. The back of the skull is missing.

The only other material representing *bruijnii* includes the two individuals from the Fly River which we described as a separate race, *P. b. brassi*. In Genoa, material collected by Loria in Papua (C. E. Nos. 3200, 3609,

3616) labeled *bruijnii* is really *Melomys levipes* and *M. leucogaster*.

Pogonomys bruijnii is clearly a highly arboreal rat, and this probably accounts for the difficulty collectors have in obtaining it. It appears to be a lowland, rain-forest species.

Pogonomelomys bruijnii brassi

Tate and Archbold

Pogonomelomys bruijnii brassi TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 6.

TYPE: A.M.N.H. No. 105033, adult male, from Oroville Camp, upper Fly River, 30 miles above D'Alberts Junction, 60 meters, August 10, 1936, collected by G. H. H. Tate.

MATERIAL: The type and a second juvenal topotype without skull. The principal distinction seen between *brassi* and true *bruijnii* lies in the much smaller size of *brassi*.

THE *Pogonomelomys sevia-rümmleri*
GROUP

***Pogonomelomys sevia* (Tate and Archbold)**

Melomys sevia TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 803, p. 3.

TYPE: A.M.N.H. No. 79755, adult male, from Sevia, Cromwell Range, Saruwaged, Huon Peninsula, 1400 meters, collected March 14, 1929, by R. H. Beck.

Our earlier statement that the under side of the tail of "*Melomys*" *sevia* is not of prehensile character must be reversed. Wetted down and under a high-power microscope the series of flat, pallid wrinkles, so easily visible in other *Pogonomelomys*, in *Pogonomys*, and other mammals having prehensile tails, can be distinguished with certainty. This brings the status of *P. tatei* Hinton into question and raises the probability that the two are either synonymous or closely related subspecies.

[*Pogonomelomys sevia tatei* Hinton]

Pogonomelomys tatei HINTON, 1943, Ann. Mag. Nat. Hist., ser. 11, vol. 10, p. 554.

TYPE: B.M. (S.M. No. 708), female, from Purari-Ramu divide, New Guinea, 8000 feet, June, 1940, collected by F. Shaw Mayer.

This form is based upon three paratypes in the British Museum. A comparison of the dimensions of *tatei* and *sevia* (table 5)

suggests that they are very close relatives. Both differ sharply from *P. rümmleri* of the highlands of Netherlands New Guinea in having much larger teeth.

***Pogonomelomys rümmleri* Tate and Archbold**

Pogonomelomys rümmleri TATE AND ARCHBOLD, 1941, Amer. Mus. Novitates, no. 1101, p. 6.

TYPE: A.M.N.H. No. 150669, young adult male, from Lake Habbema, north slope of Mt. Wilhelmina, Netherlands New Guinea, July 26, 1938, collected by W. B. Richardson.

MATERIAL: In addition to the type, a series of 42 specimens from the highlands of Netherlands New Guinea near Mt. Wilhelmina between 2800 and 3500 meters.

The color of the long soft fur is dark wood brown, much darker than that of the cinnamon-colored *sevia*. Outstanding characters in this species are the very narrow zygomatic plate (2.7 to 2.9 mm.) and the shortness of the molar series (4.4 to 4.6 mm.) which is considerably less than the length of the incisive foramina (5.0 to 5.2 mm.).

***Pogonomelomys fraterculus* (Thomas)**

Uromys fraterculus THOMAS, 1920, Ann. Mag. Nat. Hist., ser. 9, vol. 6, p. 428.

TYPE: B.M. No. 20.7.26.26, adult male, Mt. Manusela, central Ceram, altitude 6000 feet, collected January, 1920, by the Pratt brothers in "thick jungle."

The dorsal pelage of the type is very long and soft and dull light brown; under parts are buff, with the hair bases gray. Hands and feet buff. Width of hind foot at fifth metatarsal, 3.6 mm. Tail dark above, paler beneath; its scales 14 per centimeter, scale hairs three per scale and one and one-half scale lengths.

The rostrum of the skull is elongated, its width, 4.8 mm. Zygomatic plate narrow, straight. Incisive foramina long and narrow. Incisors orthodont. Molars long and narrow.

The relationship of this unique specimen would seem to be with the *sevia-rümmleri* group rather than with *mayeri* or *bruijnii*. Rümmeler (1938) first intimated relationship with *sevia*. If the affinity is genetic the question naturally rises how the common ancestor of *fraterculus* and *rümmleri* descended to sea level, crossed the sea to Ceram, and reascended to 6000 feet. The more reasonable

assumption is that the common ancestor lived in the lowlands and that ascent to the highlands in each case occurred after geographical separation.

There is nothing in Thomas' description or in my notes to indicate that the tail of *fraterculus* is of *Pogonomelomys* character. But Mr. T. C. S. Morrison-Scott, who recently examined the type for me, writes that the upper surface of the tip of the tail is prehensile for about the terminal 5 mm.

RATTUS FISCHER

Rattus FISCHER, 1803, Das National Museum der Naturgeschichte zu Paris, vol. 2, p. 128.

TYPE: *Mus rattus* Linnaeus.

Since I last wrote on *Rattus* (1936), three workers, Rümmler (1938), Sody (1941), and Ellerman (1941), have dealt extensively with the genus. Rümmler's work consisted of a study of the rodents of New Guinea, and among other things he indicated the inter-relationship of *Rattus leucopus* and *Stenomys*. Sody split off about a dozen groups of *Rattus* as full genera. Ellerman in his monumental two-volume work on the rodents treated *Rattus* under species groups. Some years later (1947) he, too, proposed a number of new names for the groups of *Rattus*, though he conservatively maintained them as subgenera. But in some respects he went even farther than Sody; he regrouped many species extensively, and in certain cases (*Apomys* Mearns, *Maxomys* Sody, and *Stenomys* Thomas) greatly enlarged and modified the original concepts of the authors of the names.

Both Ellerman and Sody dealt to a greater or lesser extent with Papuan and Australian *Rattus*. Sody proposed *Geromys*, with *Mus gestri* as type, from Kapa Kapa on the south coast of New Guinea (see my discussion of *gestri*, beyond). Ellerman, expanding *Stenomys* Thomas to embrace a number of East Indian rat species, included in it *ringens* from south New Guinea and many relatives, as well as its type *verecundus*; in this he followed Rümmler. He enlarged *Maxomys* Sody, founded on *Rattus bartelsi*, in much the same way and included in it *shawmayeri* Hinton from northwest New Guinea. *Apomys* Mearns, founded upon a rat from the Philippines, was likewise enlarged in scope and made to include *Stenomys niobe* Thomas and

its allies. Ellerman's subgenus *Rattus* was then divided into 22 groups, of which eight occur in Australia or New Guinea.

Previously, Thomas (1910) had reviewed the Australian genera and under "*Epimys*" had listed 21 names, all of which remain today within the genus *Rattus*.

In my own view, the genus *Rattus* of New Guinea and Australia includes four, or possibly five, major divisions, each of which contains varying numbers of groups:

1. *Rattus rattus* and *norvegicus* division, the exotic species introduced by white man.

2. *Rattus exulans-concolor* and *browni* division, the small-sized "Malay rat," mammary formula $2-2=8$, which has spread all through the Malay area, the East Indies, and the Pacific islands. It readily enters houses and lives in the thatch of native huts. It was probably carried about the Pacific in big canoes which it entered at night while they were loaded with provisions in readiness for long voyages. It is common around habitations in many parts of New Guinea and the Solomon Islands but is confined to the extreme northwest parts of Australia where it is still rare.

The two foregoing divisions have very close relatives, namely, many subspecies of the same species, outside the New Guinea-Australian region. Those divisions that follow have not such close relatives but represent distinctly isolated types.

3. *Rattus assimilis-ruber-leucopus-niobe* division, a very large, rain-forest-inhabiting complex of rats found everywhere in the areas under consideration except the open-forest and desert regions. Its members, which penetrate even quite narrow gallery woods margining permanent streams, seem unable to tolerate open-forest environments.

The division comprises all those medium-sized to large- and some small-sized *Rattus* that have moderately fine (*niobe*) to bristly or even spinous pelage, the skull and rostrum unshortened, and neither the incisive foramina nor the bullae exceptionally lengthened (compare the *lutreolus* division).

The truly Australian members of the division, *assimilis* and *greyi*, have the mammary formula $2-3=10$ ($1-3=8$ in *R. a. coracius*). With the exception of some anomalous rats from the Vogelkop area, the New Guinea

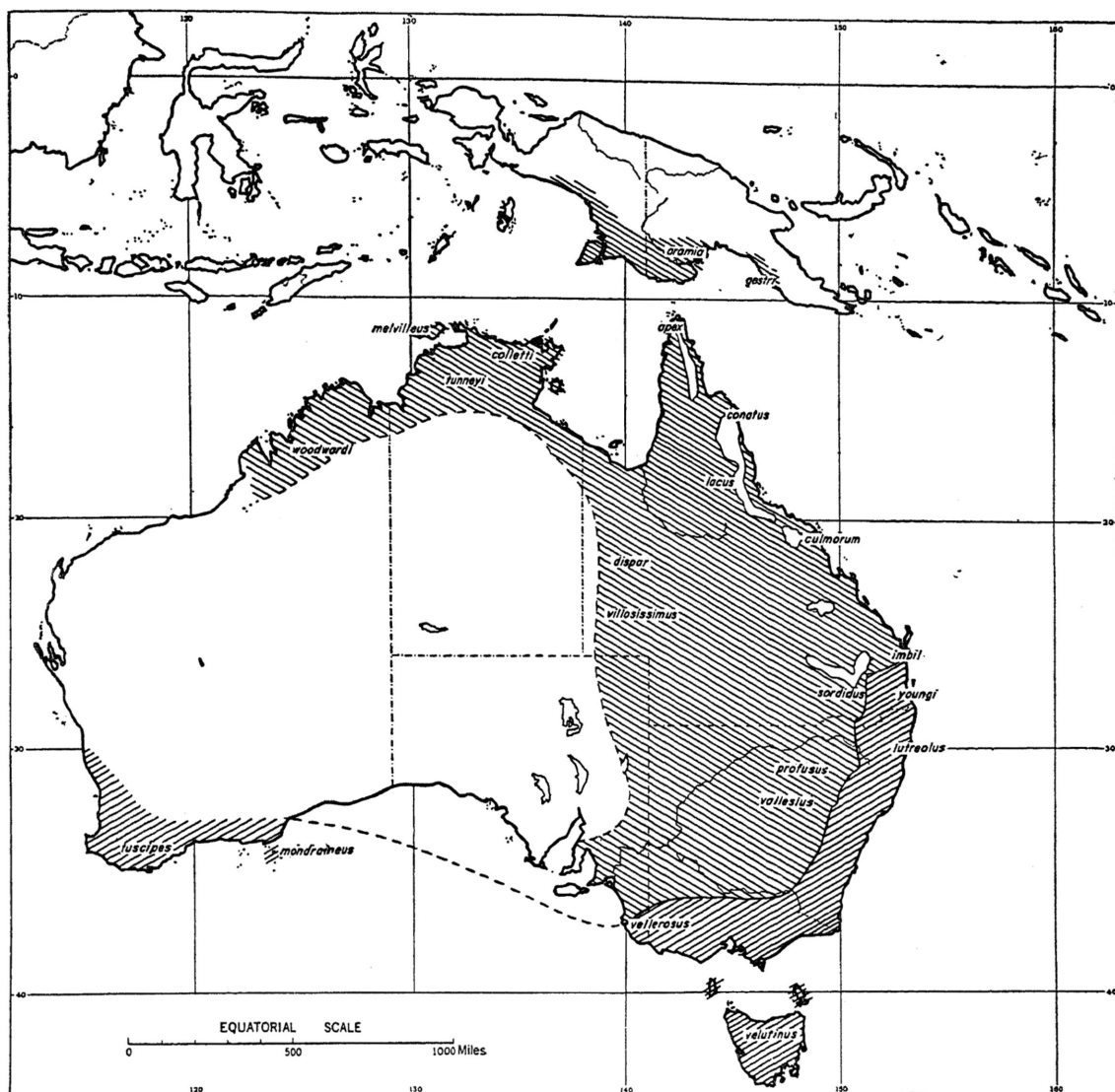


FIG. 4. Distributional pattern of an Australian group of rats, the *Rattus lutreolus-youngi-gestri* division, showing invasion of southern New Guinea. The *lutreolus* group of swamp-loving rats, in the south and east of Australia and Tasmania, is shown by differential shading.

members have the mammary formula reduced to $2-2=8$ in the *ruber-praetor* group, and to $1-2=6$ in the *leucopus* and *niobe* groups.

4. *Rattus lutreolus-youngi-sordidus-gestri* division, like the previous division, has no close relatives outside Australia and New Guinea. Reversing the habitat preferences of the *R. assimilis* division, it occurs chiefly in open forest, and it tolerates environments

with relatively low rainfall. One of its members, *R. villosissimus*, is the "plague rat" of central Australia. *Rattus villosissimus* is not so named for the disease but because it increases cyclically to enormous numbers of individuals, which constitute plagues and which eat all the vegetation.

The division is mainly Australian, only one group, *gestri*, being Torresian and present in the grasslands of south New Guinea and

Port Moresby. In contradistinction to the *assimilis* division, the *lutreolus* division is characterized by shortness of skull and rostrum and by tendencies to develop elongated, slit-like incisive foramina and greatly inflated bullae.

5. There remain a very few *Rattus* which do not clearly fit into the foregoing classification. They are *Rattus doriae* Trouessart of Sorong, in the Vogelkop area (which may be nothing more than *R. rattus*, in the first division); *Rattus vanheurni* Sody from near Manokwari in which the mammae are reputed to be "3-2"=10; and *R. richardsoni* Tate, a species with soft, lax pelage, from the extreme highlands of New Guinea north of Mt. Wilhelmina, placed provisionally in the *R. niobe* group.

THE MAMMARY FORMULA IN *Rattus*

I have already discussed the mammary formulas of various rodent genera. In regard to *Rattus*, authors have from time to time pointed out the existence of a degree of unreliability in the mammary count of *Rattus rattus* (Delano, 1924), and some degree of variability is doubtless found in that commensal species. But I am convinced that the mammary formula is relatively much more stable among the wild rats of southeastern Asia, the East Indies, and Australia despite the fact that Ellerman (1949, pp. 188-191) listed a series of exceptions. Those exceptions may well be quite rare, and Ellerman naturally was unable to indicate the frequency of their occurrence. Sody (1941, pp. 257-261), who also discussed the matter, relied perhaps too heavily upon the relative invariability of the mammary count. He extended it to genera, with reason in such a case as *Melomys* but not so in some other cases. When anomalies in mammary counts are evaluated, it is necessary to distinguish between actual absences of the nipple pairs seen normally in any given form and abnormally absent, and undeveloped, or supernumerary, nipples. One must guard against apparent absences which are due to errors in observation, such as inability to find the organs because of occasional underdevelopment of individual mammae or the very small size of the nipples in youth. In many dried skins, for example, in *assimilis*, which has long soft fur, it is particularly

difficult to find the anterior pectoral and the posterior (third) inguinal pair of mammae. I myself fell into this error in 1936 and mistakenly indicated the mammary formula of *R. assimilis* as 1-2=6, when in reality it is 2-3=10.

In the case of *Rattus leucopus* versus *Rattus ruber* and *praetor*, I believe the respective counts to be very stable, namely, 1-2=6 and 2-2=8. Ellerman (1949, p. 190) implies, however, that they vary. Yet these two classes of rats, which I could invariably distinguish in the field in the Astrolabe Range without any reference to the mammary formula, are nonetheless much alike in the laboratory. My field diagnoses were in each case confirmed later when the numbers of mammae of the females were checked.

Rattus leucopus and *R. assimilis coracius* have been available in sufficient numbers (of alcoholic specimens) for a fairly extended comparison to be made. The formula 1-2=6 has been clearly observed, in two *leucopus* from Lockerbie, at the tip of Cape York, five from Rossville Creek, 30 miles south of Cooktown, and (less clearly in that not all the mammae could be found) six from Mt. Finnegan, near Rossville Creek but at a much higher elevation (± 3000 feet). A single specimen (A.M.N.H. No. 155036) has the formula of *coracius* (1-3=8), which occurs only a few miles farther south. Many specimens of *coracius*, including two from Russell River, south of Cairns, give the formula 1-3=8. I am indebted to Mr. Hobart Van Deusen of the Department of Mammals for making the foregoing nipple counts.

Sody (1941, p. 260) proposed *Geromys*, with *Mus gestri* as its type. Now *gestri*, as pointed out under that species, is composite, inasmuch as Thomas had a female of another species mixed with the *gestri* series and that female has the mammary formula of 2-3=10 indicated for *gestri* by Sody. Actually, since the formula of *gestri*, based upon dozens of specimens, is 3-3=12, Sody's definition of *Geromys* should be amended. This is certainly not Sody's fault, as Thomas was in error originally on this point.

THE STATUS OF *Stenomys* THOMAS

Stenomys was founded upon the Papuan rain-forest species *verecundus*, a bristly-

haired rat which is very similar to the local (Astrolabe Mountains region) race of *Rattus leucopus*. Other smaller, soft-haired mountain rats subsequently referred to *Stenomys* have no bearing on the identity of the type species. The general structure, the teeth, and the mammary formula (1-2=6) of *Stenomys verecundus* and *Rattus leucopus* (Astrolabe race) are much alike. *Stenomys verecundus* apparently differs chiefly by its slighter build and sloping zygomatic plate.

If the view set forth above is right, it will follow that Rümmler (1938) was correct in combining *Stenomys verecundus* and *Rattus leucopus*, though in my view, and contrary to that expressed by Frechkop (1948), he should not have accorded *Stenomys* full generic rank. Instead I think that we should recognize a *Rattus leucopus* group, which will then equal *Stenomys* Rümmler minus the *S. niobe* group. *Stenomys verecundus*, with mammary formula 1-2=6, thus becomes an additional species of *Rattus*, closely related to *R. leucopus*, and *Stenomys* is reduced to a subgenus or even a synonym of *Rattus*. The Solomon Islands *praelor* belongs elsewhere (with *mordax*) as its mammary formula is 2-2=8.

The mountain-dwelling "*Stenomys*" *niobe* and its relatives belong only remotely to *R. leucopus* (+*verecundus*), as I suspected earlier (Tate, 1936, p. 581). Nevertheless they are

forms of *Rattus*, if somewhat anomalous ones, as Ellerman (1949, pp. 39, 45) points out. They are perhaps best treated as a distinct group, the *R. niobe* group, to which *Nesoromys* of Ceram may or may not belong.

THE *Rattus rattus* AND *Rattus norvegicus* DIVISION

In the course of many years, representatives of the roof rats and the Norway rats have been brought by ship to the coasts of New Guinea and Australia and have established themselves there with varying degrees of success. Recently acquired material, such as the quite numerous specimens of those rats captured during the last war, have been promptly and readily identified when they came to American museums. There are, however, certain older published records of rats possessing the mammary formula of the roof rat (2-3=10), some of which have received names that require discussion. They are:

1. *Mus beccarii* Peters and Doria, found to be preoccupied and renamed *doriae* by Trouessart, from Sorong, western Vogelkop
2. *Rattus vanheurni* Sody, from Manokwari, Vogelkop
3. *Rattus gestri bunae* Troughton, from Buna, northeast Papua
4. The female of "*Rattus gestri*" from Kapa Kapa, referred to by Thomas (1897, Ann. Mus.

TABLE 4
COMPARISON OF THE SKULL MEASUREMENTS OF *Rattus doriae* AND *Rattus vanheurni* WITH THOSE OF *Rattus rattus alexandrinus*

	<i>Rattus rattus alexandrinus</i>					<i>Rattus doriae</i> , Type	<i>Rattus vanheurni</i> , Type
	♂	♂	♂	♀	Average		
Condylobasal length	38.0	—	39.5	—	38.7	42.4	33.0
Zygomatic breadth	18.4	18.8	19.7	19.9	19.2	22.8	17.1
Length of nasals	14.7	13.2	15.0	14.0	14.2	—	12.5
Least interorbital breadth	5.6	5.7	5.9	5.9	5.8	6.4	5.6
Breadth of interparietal	10.4	11.0	11.7	10.6	10.9	11.1	10.7
Palatal length	21.6	21.5	22.6	22.2	22.0	24.2	18.4
Length of incisive foramina	7.7	7.4	7.6	7.4	7.5	8.8	6.7
Length of bulla	6.8	—	6.6	7.0	6.8	7.1	5.4
Width of zygomatic plate	4.0	4.0	4.2	4.0	4.1	4.6	3.2
Length of m ¹⁻³	6.5	6.5	6.7	6.6	6.6	6.5	6.3
Length of m ¹	3.2	3.2	3.5	3.4	3.3	3.1	3.2
Width of m ¹	2.1	1.9	2.1	2.0	2.0	2.0	1.8

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5. A female in the Australian Museum, Sydney, New South Wales, from Rigo, near Kapa Kapa

I have before me five true *R. r. alexandrinus* from Hollandia (specimens in the Chicago Natural History Museum), which serve as an excellent base of comparison for the foregoing dubious cases. All are adult. There are four males and one female. The tail in each is slightly longer than the head and body. The length of the hind foot with claws varies from 31 to 34 mm. Skull measurements are given in table 4.

It will be seen from the measurements in table 4 that the type of *doriae* is slightly larger than the standard *R. rattus*, though its teeth agree very closely. The tail to head and body measurements (185:190 mm.) show the correct proportions. It seems likely that *doriae* is an old example of *Rattus rattus*.

The type of *Rattus vanheurni* is a quite young female, with some of the skull sutures still open. It is so young that the braincase is still full and rounded and practically without temporal ridges. The measurements of this specimen are naturally smaller than those of our four *Rattus rattus*, while the teeth are only slightly (0.2 mm.) smaller. The tail, however, is shorter than the head and body, according to Sody's measurements, though this seeming shortness may be due to some accident of trapping. The measurement of the hind foot (s.u.) is 31 mm., a size too great in a young specimen to agree with the *exulans* group. There remains the possibility that it is a young *ruber*. *Rattus ruber* agrees with *vanheurni* in having the tail shorter than the head and body. The tooth sizes are in close enough agreement, but the extra pair of nipples in *vanheurni* seems to preclude such relationship. I think we can be fairly sure that *vanheurni* must fall as a synonym of one or another of the *Rattus* known on the Vogelkop.

Rattus gestri bunae Troughton, discussed in detail under *gestri*, must remain temporarily unplaced.

The female "*gestri*" of Thomas from Kapa Kapa, near Port Moresby, and the female from the same locality at Sydney are both undetermined, so far as this work is concerned. I have no doubt that they are alike, but they are not *gestri*, which is a member of

the Australian *lutreolus* division and has large bullae and a short rostrum. The New Guinea females of that species have the mammary formula 3-3=12, or one pair (the most anterior pectoral) more than have the two female rats being considered.

Rattus r. rattus, *R. r. alexandrinus*, and *R. norvegicus* have become established, at least temporarily, in many places in Australia and New Guinea. We have the following records:

The black rat (*rattus*): Guadalcanar, Solomons (M.V.Z., Univ. Calif.), 3; Hollandia, north coast of New Guinea (C.N.H.M.), 1.

The roof rat (*alexandrinus*): Guadalcanar, Solomons (M.V.Z.), 3; Hollandia (C.N.H.M.), 5; Manokwari, Vogelkop (C.N.H.M.), 1.

The Mediterranean fruit rat (*frugivorus*): Daru, mouth of the Fly River, 1. This white-bellied form is quite widely dispersed over the Pacific. It also occurs on the Cocos-Keeling Atoll in the Indian Ocean.

The Norway rat (*norvegicus*): Hollandia, north coast of New Guinea (C.N.H.M.), 1.

Dahl (1897) recorded the black rat in Arnhemland. Troughton (1923) stated that *Hapalotis personata* Krefft was a domestic rat. Lönnberg (1913) recorded *R. rattus* at Derby. *Rattus chionogaster*, described by Lönnberg and Mjöberg (1916) from Tolga on the Atherton Tableland was apparently an example of the fruit rat, *R. r. frugivorus*.

THE *Rattus exulans-concolor-browni* DIVISION

This section alone of the wild rats of Australia and New Guinea (if *Rattus rattus* is excepted) is distributed far beyond the geographical limits of this paper. In 1936 I treated it under the heading *Rattus concolor* group. It has received a great deal of attention in the literature, since it is a well-known disease carrier, and there exist everywhere numerous named races, extending from the Malay area out through the East Indies to Hawaii and New Zealand. It is apparently readily carried about in native boats and canoes, and it must be generally plastic, inasmuch as various local soft-haired mountain races and color forms have developed on some of the larger islands reached by it.

These rats, sometimes named "Malay rats," and the unrelated *R. niobe* group (see beyond), comprise the smallest-sized rats of

the genus *Rattus*. The unspecialized skull and teeth much resemble very small models of the skull and teeth of *Rattus rattus*. With the exception of rare abnormal individuals, the females have the mammary formula 2-2=8. I have followed Ellerman (1949, p. 47) in making most of the members of the *exulans* (= *concolor*) group one species, though I have treated *Rattus glauerti* and *Rattus rennelli* as distinct species.

Despite the fact that the *exulans* division has developed races reaching as high as 6000 feet in the mountains of New Guinea, and even higher elsewhere (Sumatra, Celebes, Philippines), I feel that this class of *Rattus* is a relatively new arrival in the New Guinea-Australia region in comparison with most other groups of *Rattus*. It appears now to be at a peak of distributional success in the East Indies and the Pacific islands, yet, notwithstanding this fact, it has barely gained a footing in Australia (on an island off Collier Bay, near Derby). None of the other groups of *Rattus* of Australia and New Guinea, successful as they are in their own ecological environments, possess such obviously very close surviving relatives in the East Indian archipelago as does the *exulans* division.

It seems possible that the British Museum specimens from Collier Bay were taken there by ship, perhaps from one of the Lesser Sunda Islands, though just as possibly from Celebes, Borneo, or Java. I think it less likely that they came from New Guinea. It seems, in view of the uncertainty of their origin, preferable to refer them, beyond, simply to *R. exulans* without subspecific denomination.

In recent years the "Malay rats" of New Guinea, formerly known as *R. browni*, have been divided, chiefly by Troughton, into a number of species and races, some of which appear to be not very distinct. The total list of named forms follows:

RACE	TYPE LOCALITY
<i>aitape</i> Troughton	Aitape District
<i>gawae</i> Troughton	Gawa Island, east of Papua
<i>lassacquieri</i> Sody	Mountain near Manok- wari, 1800 meters
<i>manoquarius</i> Sody	Manokwari, Vogelkop
<i>praecelsus</i> Troughton	Mt. Hagen district, 6000 feet
<i>suffectus</i> Troughton	Mt. Lamington

<i>tibicen</i> Troughton	Fyfe Bay, longitude 150° E., southeast Papua
<i>browni</i> Alston	Duke of York Island
<i>rennelli</i> Troughton	San Cristobal Island, Solomon Islands
(species)	
<i>glauerti</i> Thomas	Houtman's Abrolhos, Western Australia
(species)	

It will be noted that two of these races, *lassacquieri* from the Vogelkop and *praecelsus* from the Mt. Hagen area, are highland forms.

The group has been regarded as absent from Australia. With the exception of *glauerti* it does not appear on the check list of Iredale and Troughton (1934). It is or was, however, present near Collier Bay, north of Derby (specimens registered in the British Museum in 1891). *Rattus rennelli* and *R. glauerti*, owing to differences of size and proportions, are here maintained as full species. *R. glauerti* was first described as a race of *fuscipes*. Despite very extensive trapping, which resulted in the capture of hundreds of *Rattus* of other species, not one example of the *exulans* group was obtained in the Cape York Peninsula by the 1948 Archbold expedition.

Rattus exulans, subspecies from Australia

MATERIAL: B.M. No. 91.10.9.1, old male, from Adele Island, off Collier Bay, near Derby, north Western Australia, collected by J. J. Walker. The specimen skinned from alcohol. Perth Museum No. 620, adult, labeled *woodwardi*, without skull, collected by J. T. Tunney at Lagrange Bay.

The rather spinous pelage of the Collier Bay specimen is now somewhat reddish; the under parts are white, without gray-based hairs; hands and feet white. Tail scales 10 per centimeter (possibly stretched), the scale hairs two scale lengths. The bullae are a little larger than those of *Rattus exulans maorium*, the molar teeth narrower, worn down; the pterygoid fossa narrower. The measurements are given in table 5. The length of the hind foot (s.u.) of the Lagrange Bay specimen is 24 mm.

Apart from the slightly anomalous *glauerti*, these are the only records known to me of the presence of any representatives of the *exulans* group in Australia.

It should be noted that *R. exulans* subspecies occurs also on the Aru Islands (B.M. No. 10.3.2.15), Ceram (B.M. Nos. 20.7.26.17—

20.7.26.18), and Amboina (B.M. Nos. 10.3.4.114 and 11.7.12.33-35).

[*Rattus exulans aitape* Troughton]

Rattus browni aitape TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 122.

TYPE: Sydney, No. M.3721, adult female, collected in Aitape District, longitude 142° 30' E., Netherlands New Guinea, by R. F. Armstrong, 1925.

MATERIAL: A series of 35 skins with skulls from Marienburg on the Sepik River and from Hollandia on the north coast of Netherlands New Guinea, as well as 12 skulls without skins from Hollandia in the Chicago Natural History Museum. The American Museum of Natural History has 17 specimens from Hollandia. There is one from Marienburg in the Museum of Comparative Zoölogy.

This weakly distinguishable race is assumed to occupy the whole of the northern side of New Guinea between Geelvinck Bay and the Huon area.

[*Rattus exulans gawae* Troughton]

Rattus browni gawae TROUGHTON, 1945, Rec. Australian Mus., vol. 21, p. 374.

TYPE: Sydney, No. M.6370, female, Gawa Island, Marshall Bennett Islands, between Trobriand Islands and Woodlark Island, east of Papua, collected by W. H. Harrington, July 27, 1937.

Troughton separated this race chiefly on account of the presence of ochraceous pigmentation on the throat and the dark color of the hands and feet. Throat coloring is known often to be caused by food stains in *Rattus*. The under parts of *gawae* are pale cinnamon buff.

Probably referable also to *gawae* are two specimens (B.M. Nos. 3.7.6.2-3.7.6.3) from the Conflict group in the Trobriand Islands. Those two animals almost exactly resemble animals from Kermadec, between Fiji and New Zealand.

[*Rattus exulans lassacquieri* Sody]

Rattus concolor lassacquieri SODY, 1933, Ann. Mag. Nat. Hist., ser. 10, vol. 12, p. 433.

TYPE: Sody, No. 51, adult female, from Anggi Guyi Mountain, near Manokwari, Vogelkop, 1800 meters, collected by G. de Lassacquièr.

Dorsal color of type grayish brown. Under parts brownish buff, the hairs with gray bases. Pelage soft. Guard hairs, though flat, narrower and weaker than in *manoquarius*. Tail rings about 13 per centimeter. Palatal foramina wider; molars broader.

This is one of the highland-inhabiting races found in New Guinea.

[*Rattus exulans manoquarius* Sody]

Rattus concolor manoquarius SODY, 1934, Natuurk. Tijdschr. Nederlandsch-Indie, vol. 94, pp. 175-176.

TYPE: Sody, No. 57, adult male skinned from alcohol, from Amberbaki, Vogelkop, Netherlands New Guinea, collected by Sody.

MATERIAL: An adult and a juvenal (C.N.H.M.) from Manokwari, which are virtual topotypes; from Sansapor, west of Manokwari, Vogelkop, collected by C. O. Mohr, three.

Pelage of type rather coarse, a mixture of hairs and flat spines, colored dark brownish gray. Under parts dull white, with gray hair bases. Tail scales about 18 per centimeter.

In 1936 I referred all New Guinea mainland specimens to the group *manoquarius* rather than to true *R. e. browni* of the Bismarcks and the Solomons. *Rattus e. manoquarius* is here restricted to the Vogelkop area.

[*Rattus exulans praecelsus* Troughton]

Rattus browni praecelsus TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 121.

TYPE: Sydney, No. M.6110, adult male, collected in southward-draining upper Wahgi Valley, 15 miles southeast of Mt. Hagen, by G. A. M. Heydon (about 6000 feet).

Spines few or absent. Pelage thick and soft. Color much as in *browni*, but the tail stated to be longer and the ear larger.

The range of this race is probably continuous with the mountain-inhabiting representatives of the southwestern race *tibicen*.

The possibility of some relationship with *lassacquieri* should be examined.

[*Rattus exulans suffectus* Troughton]

Rattus browni suffectus TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 122.

TYPES: Holotype and allotype, Sydney No. M.4156, adult male, and No. M.4153, female,

collected in the Mt. Lamington district, northeast Papua, by C. T. McNamara in 1929.

MATERIAL: I have referred four specimens from Finschhafen (C.N.H.M. Nos. 54044-54047) and one from Sevia, Huon Peninsula, formerly (Tate, 1936) called *manoquarius*, to the present race.

The color of the type is reported as "cinnamon rufous to tawny," of the under parts "grayish olive buff, though the chest and upper belly are washed with cinnamon." Tail scales 13 per centimeter.

[*Rattus exulans tibicen* Troughton]

Rattus browni tibicens TROUGHTON, 1939, Rec. Australian Mus., vol. 20, p. 123.

TYPE: Sydney, No. M.2483, adult male, from Fyfe Bay, near Isudau, near Samarai, eastern end of Papua, collected by H. P. Schlenker about 1897.

MATERIAL: Kokebagu, near Rigo, one; Sogeri, three, and Baruari, one (both places in Astrolabe Mountains, about 1500 feet); Kagi, Moresby-Kokoda track, 5000 feet, seven; Baroka, Mekeo District, three; Mafulu, four.

Pelage of the type "short, sparse, and softly spinous . . . the general color . . . drabby Prout's brown . . . deep olive buff of the underparts."

There appears to be no difference between our series from the Moresby area and the type from the eastern end of the same coast, nor can I find any appreciable difference between specimens from differing altitudes.

Rattus exulans browni (Alston)

Mus browni ALSTON, 1877, Proc. Zool. Soc. London, pp. 123, 743.

Mus echimyoides RAMSAY, 1877, Proc. Linnean Soc. New South Wales, vol. 2, p. 15.

TYPES: Of *browni*, B.M. No. 77.7.18.26, adult female, cotype, from Duke of York Island, north of New Britain, collected by the Rev. G. Brown. Back of skull missing. Of *echimyoides*, not seen.

MATERIAL: Bougainville Island, Solomon Islands, eight; Guadalcanar (University of California), two; Emirau, longitude 150° E., Bismarck Archipelago, five. Skin of type dark wood brown, the hairs all crisp and short; under parts dirty white. Mammary, 2-2 = 8.

This name, formerly applied widely in New Guinea, is here restricted to rats from the type locality, the Bismarcks, and the western Solomon Islands.

Rattus glauerti Thomas

Rattus glauerti THOMAS, 1926, Ann. Mag. Nat. Hist., ser. 9, vol. 18, p. 308.

TYPE: B.M. No. 26.7.12.2, adult (not sexed), East Wallaby Island, Abrolhos group, off Geraldton, Western Australia, collected by C. P. Conigrave, November 17, 1907, received from Perth Museum. "Caught among rushes on sand hills."

Dorsal pelage of type long, grayish brown. Under parts buffy white, with the bases of the hairs gray. Hands and feet white. Tail scales 17 per centimeter, scale hairs two scale lengths.

Skull with full, rounded braincase; wide interparietal; rather narrow interorbital regions; nasals surpassing premaxillae; incisive foramina moderately wide and long; bullae rather large; interdental palate wide; teeth very small. Skull strongly resembles that of the *exulans* group.

The fact that this rat which so much resembles *R. exulans* is found on an island and not on the mainland mildly supports the view that it may be one of the *exulans* rats which was taken to the Abrolhos by boat. However, it appears to differ more sharply from the various Papuan forms of *exulans* than they do from one another and should be held, at least provisionally, as a full species.

Rattus rennelli Troughton

Rattus rennelli TROUGHTON, 1945, Rec. Australian Mus., vol. 21, p. 375.

TYPE: Sydney, No. M.4213, male, with allotype, from Rennell Island, 90 miles southwest of San Cristobal, Solomon Islands.

Color of the back of type "ochraceous tawny to Prout's brown." Under parts "greyish washed with a tipping of light buff." Tail scales 10 to 11 per centimeter.

This rat is apparently a quite distinct species, considerably larger than the very closely interrelated forms of *exulans* just listed. I had thought it might be an outlier of *R. praetor*, but *praetor* is again larger, its molar tooth row ± 7.0 mm. against the 5.5 mm. of *rennelli*. The mammary formula 2-2

= 8 fits both *exulans* and *praetor*. The measurements present general disparity with other members of the *exulans* group and it may not belong here.

THE *Rattus assimilis-ruber-leucopus-niobe* DIVISION

In this division belong all those *Rattus* of Australia and New Guinea that have elongate muzzles, normal incisive foramina (not slit-like), and small bullae. Most of the species are large, but there exists one group of quite small species, typified by *R. niobe*, which is as small as those of the *exulans* division. The pelage and other plastic structures in the division are as varied as may be expected in a chain of species reaching from the Equator to the extreme south of Australia. Though primarily developed in New Guinea and Australia, the division has offshoots in Ceram, the Moluccas, and the Solomon Islands. Its structure offers no clue to its ancestry, but it probably came from Malaysia. Later began the tendency, well advanced in New Guinea species, towards reduction of the mammary formula.

This division is characterized by elongation of the skull and rostrum. The incisive foramina though moderately lengthened, never become slit-like in their proportions. The bullae are never much enlarged. The mammary formula may be 1-2=6, 1-3=8, 2-2=8, or 2-3=10, but never 3-3=12. The preferred habitat is rain forest and gallery forest, almost never open, dry, grassy country.

The groups into which the present division is separable are:

<i>Rattus assimilis</i> group	Australian rain-forest rats with long, soft hair and high zygomatic plate. Includes <i>R. greyi</i>
<i>Rattus ruber</i> group	North New Guinea rats with sometimes very slightly shortened rostra (at least in eastern New Guinea), spinous or moderately soft pelage, and mammary formula 2-2=8. Includes <i>praetor</i> and <i>mordax</i> . Some forms very large
<i>Rattus leucopus</i> group	Rats of New Guinea, chiefly south of the Central Range, and in Cape York Peninsula. Nearly all forms strongly spinous. Mammary formula 1-2=6. In contact at the base of the Cape York Peninsula with <i>R. assimilis</i> . In New Guinea penetrates to the north side of the Central Range at its eastern end and (the species <i>verecundus</i> only) encircles said mountains at levels between 1000 and 6000 feet
<i>Rattus niobe</i> group	Quite small high-mountain rats, formerly referred to " <i>Stenomys</i> ," occurring in New Guinea at levels between 5000 feet and just below the snow line. Mammary formula 1-2=6. Skull reminiscent of very small edition of <i>leucopus</i> group. It seems that <i>Rattus richardsoni</i> may be an unusually large member of the group

THE *Rattus assimilis-greyi* GROUP

From seeing the types or topotypes of most of the forms referred to this group, I judge that they are either conspecific or at least belong to a single superspecific group. The southern forms (*greyi*) are generally a little smaller than the northern ones (*assimilis*), and their habitats may be drier, but from the standpoint of structure all are essentially alike. Ellerman recently (1949, p. 46) combines *greyi* with *assimilis*, but placed both, with still other forms, in the same species as *fuscipes*. I have pointed out beyond that the similarity of the incisive foramina of *fuscipes* to those of the *lutreolus-gestri* division precludes any very close relationship of *fuscipes* with *assimilis*.

In the *assimilis* group the palatal foramina are elongate and may be slightly compressed. They are broad in true eastern *assimilis*, including *coracioides*, but may be rather narrow and more pointed posteriorly in the southern races, *greyi*. The bullae, which are well rounded, show no indication of the enlargement to be seen in such forms of *Rattus* as *tunneyi* and *gestri*. The teeth are of moderate dimension and distinctly narrower than those of the swamp rat, *R. lutreolus*. The rostrum and nasals are elongate and slender. The premaxillary processes exceed the nasals backward at their contacts with the frontal. The zygomatic plates, though somewhat variable, are always well thrown forward and have the anterior edge vertical or nearly so.

The geographical distribution of this species group is in general horseshoe shaped, with breaks. The one arm of the horseshoe term

nates with the isolated *manicatus* in the Northern Territory. Then comes a break, and the group reappears as *coracius* and *assimilis* on the east coast, then westward as *greyi* and allies along the south coast. During periods of increased rainfall in Pleistocene time the "horseshoe" may have become complete and its thickness may well have increased because of its invasion of the now very dry parts of Queensland and New South Wales in the direction of the arid center of Australia. The Cape York Peninsula is penetrated by *assimilis* only so far north as the latitude of Cairns, where it is replaced by *Rattus leucopus*.

The relationships of the *assimilis* group of Australia appear to be with the *ruber-praetor* and the *leucopus* groups of New Guinea. In fact, *R. ruber tramitius*, a mountain form of which we have a large series, is remarkably like *R. assimilis coracius* of northern Queensland, even to the white pectoral patches. The principal distinction lies in the fact that the mammary formula of *ruber* is 2-2=8, while that of *assimilis* and allies is 2-3=10 or 1-3=8.

Rattus assimilis (Gould)

This large, long-haired, long-snouted Australian species occurs in three races: typical *assimilis*, found from Gympie, southern Queensland, south through the wetter parts of New South Wales to eastern Victoria; the race *coracius*, found from Cairns and the Atherton Tableland south through the rain forests to the Paluma Range, west of Townsville; and the race *manicatus*, based upon the type only, which is alleged to come from Port Essington, north of Darwin, Northern Territory. I have examined the type of the last and believe it to be very closely related to *assimilis*. There is no representative in Tasmania.

Rattus assimilis is replaced north of Cairns by *R. leucopus*, and west of its limits in southern New South Wales and Victoria by *R. greyi*. I have as yet obtained only negative evidence to show whether or not *assimilis* occupies the 500 miles of coastal range slopes between Townsville and Gympie in Queensland; it seems to be absent. Mr. Morrison-Scott, who kindly looked through the collection of *assimilis* at the British Museum for me, reports a similar hiatus. On the other hand Collett

(1887) reported "*assimilis*" from Coomoo-booloo, 80 miles southwest of Rockhampton. McDougall (1944, 1946) records it (actually the race *coracius*) from rain-forest areas in the Cairns-Ingham area. He concludes (1946, p. 228) that it does not exist in the Mackay district.

Rattus assimilis assimilis (Gould)

Mus assimilis GOULD, 1858, Proc. Zool. Soc. London, for 1857, p. 241; 1858, The mammals of Australia, pt. 10 (vol. 3), pl. 15 and text

Mus arboricola GOULD, 1863, The mammals of Australia, introduction to vol. 1, p. xxxv.

TYPES: Only one of the two "cotypes" in the British Museum, B.M. No. 58.11.24.10, is from the Clarence River, northeastern New South Wales, which Gould gave as type locality. This specimen was listed by Thomas (1921a) as "lectotype." The other "cotype," B.M. No. 58.11.24.9, is marked as collected at the Richmond River only about 30 miles to the north of the Clarence by F. Strange, in November, 1849. The type of *arboricola* is B.M. No. 97.11.23.1.

MATERIAL: The American Museum of Natural History is fortunate in possessing an almost topotypical series of these rats, collected by H. C. Raven from the headwaters of the southern branches of the Clarence River: Moseley's Ranch, 20, and Glen Ferneigh, four. These localities lie within a relatively few miles of each other at approximately longitude 152° 25' E., latitude 30° 25' S. Ebor (U.S.N.M.), 14; Gloucester, one; Milton, six; and Wandandian, 10. The Museum of Comparative Zoölogy has material from Salisbury, one; Yerranderie, one; MacPherson Range, one; Blue Mountains, one; and Mt. Kosciusko, nine.

At the Sydney Museum there are specimens from widely scattered localities in eastern New South Wales, including one from Imbil, Gympie, south Queensland (apparently the northernmost record for true *assimilis*).

The cotype from the Clarence River has long, soft pelage which is now colored grayish brown above; under parts are buffy, all hairs with gray bases. Hands and feet white. Tail slightly paler beneath than above; tail scales 10 per centimeter, the scale hairs one and one-half per tail-scale length.

Skull elongate and moderately broadened; interorbital region narrow. Interparietal wide and short. Zygomatic plate well thrown forward, broader than in *greyi*. Mesopterygoid fossa very narrow. Incisive foramina fairly long, pointed in front, rounded at the back. Bullae about as long as molar crowns.

Pure white areas of hair on the under parts are much rarer in this race than in the north Queensland *coracius*. Only two of our considerable series show a small white mark on the chest.

True *assimilis* of New South Wales can be recognized by its large size, long, very soft, and smoky brown fur, the under parts only slightly paler; tail paler beneath than above and nearly as long as the head and body. Rarely a patch of pure white hairs on chest or abdomen. The feet and hands are white-haired. The skull is strongly built; the rostrum elongate; incisive foramina long and generally wide (much wider than those of *lutreolus*); bullae rounded but not enlarged; incisors orthodont (not proodont as in *lutreolus*); molars unbroadened. Mammary formula, 2-3=10. The anterior thoracic and posterior inguinal pairs are difficult to find in dry skins.

Though the type of *arboricola* appears to be equal to *assimilis*, the animals discussed by Waite (1897) as "*arboricola*" were, according to Thomas, merely roof rats.

Troughton (1920) published an extended description of *R. assimilis*, together with good drawings of its skull and dentition. He recorded it from the extreme south of New South Wales (Kosciusko area) and from Kangaroo Island and the Eyre Peninsula in South Australia. In the last two regions the form is probably *greyi* rather than *assimilis*.

Brazenor (1936) recorded *assimilis* as "the most common indigenous Victoria rodent. . . ." He, too, illustrated the skull and teeth.

Rattus assimilis coracius Thomas

Rattus assimilis coracius THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 173.

TYPE: B.M. No. 22.12.18.28, old female, collected May 5, 1922, by T. V. Sherrin at Dinner Creek, 2900 feet, near Ravenshoe, Atherton Tableland, northern Queensland.

Thomas recorded a series of about 25 specimens.

MATERIAL: A series from Atherton Tableland collected by H. C. Raven, 48; Babinda Creek, northern Queensland, one; Lake Barrine, collected by Darlington, one; Lake Barrine, four, and on the 4000-foot level of Mt. Spurgeon, collected by Miss G. Neuhäuser, 19. Also (U.S.N.M.) Atherton Tableland, collected by Hoy, 11. Russell River near sea level, and the slopes of Mt. Bellenden Ker, collected by the Archbold expedition, 47, and Walter Hill Range, 15. I trapped five more at 1200 feet on Mt. Speck, Paluma Range, 20 miles west of Townsville.

Thomas distinguished *coracius* from southern *assimilis* by the fact that the "palatal foramina hardly reach the level of the first lamina of m^1 , and the bullae are decidedly smaller." He mentioned the frequent presence of patches of pure white on chest and belly, also to be seen in our series from the Tableland (29 of our specimens). Only one of our five specimens from near Townsville, however, has the white chest mark.

The bullae are consistently smaller than in southern *assimilis*, but otherwise the skull shows little difference. The mammary formula appears to be 1-3=8 instead of 2-3=10 as in true *assimilis*.

This is the form that seems to interdigitate with the very similar appearing *R. leucopus cooktownensis* found in rain forest immediately north of Cairns, but it differs by the reduced mammary formula, 1-2=6. Of the series of *cooktownensis* taken at Mt. Finnegan, one (A.M.N.H. No. 155036) had the formula of *coracius* and may represent a degree of infiltration northward of that rat.

Rattus assimilis manicatus (Gould)

Mus manicatus GOULD, 1857, Proc. Zool. Soc. London, p. 242.

TYPE: B.M. No. 58.11.24.7, young female, from Port Essington, near Darwin. Originally from the Gould collection. This specimen, I believe, is still unique. The recent American-Australian Expedition to the Northern Territory did not obtain specimens of it. Troughton (in a personal discussion) has suggested that *manicatus* bears an erroneous label and may in reality be a specimen of *coracius*.

The true color of the dorsal pelage of the type appears only on the head, nape, and sides. These show the brown-tipped, fuscous-based hairs of the *assimilis* rats. The rest of the back is much darker and may represent either youth or a state of molt. The under parts have silver-tipped, gray-based hairs, except median areas of the chest and belly, where they are pure white, essentially as in *coraci*. The slender hands and feet are white. Tail scales 10 to 11 per centimeter, the scale hairs one to one and one-fourth scale lengths. Mammary formula not determined.

Skull long and narrow; nasals exceeding the premaxillary "wings"; incisive foramina parallel-sided, slightly rounded at each end. Bullae small. Molars of moderate size, little worn.

Rattus greyi (Gray)

This rat, a little smaller than *assimilis*, appears to be the representative in the extreme south central parts of Australia of the *assimilis* group of *Rattus*. I have retained it provisionally as a full species, although there seems to be very little reason from the morphological standpoint for so doing, and from a distributional viewpoint it appears more nearly a smaller-sized geographical race of *assimilis* than another species. The mammary formula, 2-3=10, is the same as in *assimilis*. The teeth and alveoli were studied by Jones (1922).

The total range of the species has not been determined at all satisfactorily. The northern limit is undetermined, although Collett (1887) recorded two "*greyi*" from Coombooloo, 80 miles southwest of Rockhampton. At the same locality he also found "*assimilis*." However, his "*greyi*" was apparently some other species of *Rattus*, perhaps a member of the *lutreolus* division, as he gave the length of the bullae as 8.0 and 8.8 mm., respectively.

I have tentatively retained the following races, though it is very possible that some should be placed in synonymy:

<i>R. g. peccatus</i> (= <i>ravus</i>)	Southwestern Victoria
<i>R. g. austrinus</i>	Southern and southeastern South Australia (formerly referred to the species <i>culmorum</i> . Possibly a synonym of true <i>greyi</i>)

R. g. murrayi Island off southwest coast of South Australia

Rattus greyi greyi (Gray)

Mus greyi GRAY, in Gray, 1841, Journals of two expeditions . . . in . . . Australia, vol. 2, app. c, p. 410.

COTYPES: B.M. No. 41.1264, adult, and B.M. No. 41.1266, adult male, both from the Gould collection, from South Australia. Thomas (1921) chose the second as "lecto-type." Iredale and Troughton (1934) restricted the type locality to Adelaide.

MATERIAL: Port Lincoln, South Australia (U.S.N.M.), taken by C. M. Hoy, three; Fleurian Peninsula (M.C.Z.), collected by Wood Jones, two.

Dorsal pelage of cotypes rather long, the guard hairs attaining 25 mm. Present color brown. Feet white. Tail not paler beneath than above; tail scales 12 to 14 per centimeter, scale hairs twice one scale length. Profile of skull well curved, incisive foramina not elongated or slit-like; zygomatic plate narrow; bulla small; molars small (wider in B.M. No. 41.1266 than in B.M. No. 41.1264).

Shortridge (1936) indicates that *greyi*, as distinct from *fuscipes*, occurs in Western Australia; this should be checked.

Rattus greyi peccatus Troughton

Rattus greyi ravus BRAZENOR, 1936, Mem. Natl. Museum, Melbourne, vol. 10, p. 69 (preoccupied name).

Rattus greyi peccatus TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 189, footnote (new name for *ravus* Brazenor).

COTYPES: Melbourne, Nos. C.759, male, and C.688, female, from Portland, Victoria.

MATERIAL: Two topotypes in alcohol collected by Wood Jones.

Comparing *ravus* with *greyi* and *assimilis*, Brazenor wrote: "Dorsal fur basally gray, tipped with brown . . . long black guard hairs. Sides a little lighter, grading into the grayish white of ventral surface. Ventral hairs basally gray, tipped with grayish white . . . Ears larger than in *greyi* . . . tail longer than in *greyi* . . . Pes larger than in *greyi* . . ." He continued, "This eastern race of Gray's Rat replaces *assimilis* in the southwest corner of Victoria, and is similar to that species in its habits and habitat. . . ."

The mammary formula of the female topotype (A.M.N.H. No. 107406) is $2-3=10$. The nipples are unusually distributed, the two anterior pairs being placed, one in the pectoral area, between the fore limbs, the other in the thoracic, about 15 mm. behind the shoulder. The posterior three pairs are placed one 2 mm. anterior to the anterior margins of thighs; the other two are close together much farther behind the first, the anterior one of the two 17 mm. behind the pair just mentioned, the posterior one 22 mm. behind that pair.

The foot lengths (s.u.) are, respectively, 27 and 29 mm.; the tail is ± 130 mm.

***Rattus greyi austinus* Thomas**

Rattus culmorum austinus THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 427.

TYPE: B.M. No. 55.12.24.336, adult male, collected by J. B. Harvey before 1841. The type locality appears not to have been definitely ascertained. Thomas (*loc. cit.*, p. 427, footnote) presents evidence to show that it was Kingscote, Kangaroo Island, while Iredale and Troughton (1934, p. 74) give Port Lincoln. If it is Port Lincoln *austinus* may be synonymous with *greyi*.

MATERIAL: Birchmore Lagoon, Kangaroo Island (U.S.N.M.), 18, presumably of this race.

Pelage of type dull brown, with guard hairs more than 30 mm. in length; under parts dull buffy, with gray-based hairs; hands and feet white. Tail scales 14 per centimeter, the scale hairs two and one-half scale lengths. Back of skull and nasals broken; incisive foramina long and rather narrow; bullae fairly large; mesopterygoid fossa narrow; molars broad.

***Rattus greyi murrayi* Thomas**

Rattus murrayi THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 601.

TYPE: B.M. No. 23.3.28.6, adult male, from Pearson Island, Investigator group, west of Eyre Peninsula, South Australia, collected by F. W. Jones.

Pelage of the type light brownish gray, rather long; under parts pale grayish white, with dark hair bases; hands and feet grayish white; tail scales 12 per centimeter, the hairs two and one-half to three scale lengths. Ears large.

Compared with that of *greyi*, the skull has the rostrum longer, the incisive foramina larger, the bullae larger, but the teeth substantially smaller.

Jones (1924) gave a detailed account of this form.

THE *Rattus ruber-praetor* GROUP

In this group of rats, which Rümmler (1938) and Frechkop (1949) had placed in "*Stenomys*," the normally elongate muzzle is very slightly shorter than the muzzles of the allied *leucopus* group, found chiefly in south New Guinea, and of the *assimilis* group of Australia.

It is a difficult group to work with, not only because some of its members so closely resemble the races of *leucopus* but also because of uncertainty whether or not to regard the often very large, spinous, chiefly western members of the group (*ruber*, *coenorum*, etc.) as specifically distinct from the eastern (*mordax*, *praetor*) and mountain dwellers (*tramitius*, *hageni*) of the group, both of which have softer pelage and are smaller in size. In this paper I have provisionally placed all in *ruber*.

So far as I can determine all but one (*jobiensis*) of the forms that belong in the present group have the mammary formula $2-2=8$. The formula of *jobiensis* is unknown. The following 12 fully adult females from middle and western north Netherlands New Guinea show the mammary formula $2-2=8$: Hollandia, Cyclops Mountains, Sentani Lake, three; Doromena, 2500 feet, (C.N.H.M.), three; Idenburg River, 850 meters, one; Idenburg River, 1200 meters, two; Wasior, Arfak, one; Sansapor, Vogelkop, one; Gebroeders Mountains, one. Besides these I have numerous examples from the Astrolabe Range. On the other hand I can find no representative of the *leucopus* group ($1-2=6$) from north of the Central Range except at the extreme eastern end (*R. l. doboduriae* and *R. l. owiensis*).

The structure and habits of the group proclaim its affinities on the one hand with the Australian *assimilis-greyi* group and on the other with the Australian-Papuan *leucopus* group. Though it has only partly penetrated the parts of New Guinea south of the Central Range and has never reached Australia, it appears to be a good colonizer of islands, for in

the northeast it (*mordax*) has extended to the Solomon Islands (*praetor*, *mediocris*) and to the west the newly described *morotaiensis* Kellogg (1945) from Morotai Island in the Moluccas seems to be a derivative.

As already indicated, the lowland representatives (*ruber*, *coenorum*, etc.) in the north central and western portions of the total range are larger and more coarsely bristly than the eastern representatives (*mordax*, *praetor*). A large-sized form occurs near Dobodura (see remarks under *mordax*). Mountain-dwelling races (*tramitius*), which have denser, softer pelage, conform less closely to the western lowland races and more closely to the eastern races. *Rattus rosalinda* Hinton is placed at the end of this group.

Rattus ruber Jentink

In several parts of its range *Rattus ruber* with its races occupies the same territory as *Rattus leucopus*, the dominant species of south New Guinea and the Cape York Peninsula. This is especially to be noted at the eastern end of the island, both north and south of the Central Range, for south of the mountains of eastern New Guinea *R. ruber mordax* penetrates at least as far west as the St. Joseph and Angabunga rivers.

<i>ruber</i>	Vogelkop
<i>jوبيensis</i> (= <i>sansapor</i> = <i>biakensis</i>)	Jobi Island, Vogelkop, Biak Island
<i>coenorum</i> (= <i>bandi-</i> <i>culus</i>)	Mamberano area
<i>tramitius</i> (= <i>utakwa</i>)	Mountains south of Iden- burg River
<i>steini</i>	Weyland area
<i>hageni</i> (possibly = <i>tramitius</i>)	Mt. Hagen area
<i>mordax</i>	Eastern New Guinea to Astrolabe Mountains
<i>purdiensis</i>	Purdy Island
<i>praetor</i>	Guadalcanar
<i>mediocris</i>	Bougainville
<i>rosalinda</i>	East New Guinea high- lands

It has seemed needful to synonymize the two insular races of *biakensis* and *jوبيensis* with the mainland race *sansapor*. *Rattus ruber*, *steini*, and *coenorum* are very closely interrelated; *tramitius*, *hageni*, and probably *rosalinda* stand close together; *mordax*, *praetor*, *mediocris*, and *purdiensis* likewise are near relatives. It must be admitted here that

I was in error earlier (1936) in associating *mordax* with *leucopus* and *ringens*. *Rattus ruber mordax* is the mainland form from which the island races *purdiensis*, *praetor*, and *mediocris* are derived.

Rattus ruber ruber (Jentink)

Mus ruber JENTINK, 1879, Notes Leyden Mus., vol. 2, p. 18.

TYPE: Leiden (Jentink, Catalogue A), young adult female, from Doreh [= Manokwari], north Vogelkop, western New Guinea, collected in January, 1869, by Rosenberg.

The present color of the type skin of *ruber* (mounted) is reddish brown, due, I believe, to fading, or perhaps it was collected originally in alcohol. Tail with scale hairs about twice one scale length; the tip not white. Mammary formula, 2-2 = 8.

Skull (zygomata broken) with elongate rostrum; large incisive foramina; small molars; zygomatic plate well thrown forward. The length of the bulla considerably exceeds the length of the small molar crowns.

Rattus ruber and *Rattus praetor* were the first two members of the *ruber-praetor* group to be described. They were taken virtually from the extremes of the west-east range of the group. This fact, combined with early lack of specimens from intervening areas, perhaps explains why they were not brought closer together before.

Rattus ruber jوبيensis Rümmler

Rattus ruber jوبيensis RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 116.

Rattus sansapor TROUGHTON, 1946, Rec. Australian Mus., vol. 21, p. 409.

Rattus biakensis TROUGHTON, 1946, Rec. Australian Mus., vol. 21, p. 409.

TYPES: Of *jوبيensis*, Berlin, No. 45677, old male, from Japen Island, Geelvinck Bay, Netherlands New Guinea, collected March 28, 1931, by G. Stein. Of *sansapor*, Sydney, No. M.7195, adult male, from Sansapor, northwest Vogelkop, collected by Capt. J. T. Griffiths. Of *biakensis*, Sydney, No. M.7082, adult female, collected at Biak Island, Geelvinck Bay, March 9, 1935, by E. LeG. Troughton.

MATERIAL: Of *sansapor*, collected by C. O. Mohr, nine; Wasior, west side of Geelvinck

Bay, 1400 meters, one (formerly thought to be *coenororum*).

These types, as will be seen from the comparative measurements in table 5, appear to be identical with one another. They are very large, with large teeth and very long muzzles. I had thought at first that they were equal to true *ruber*, but that rat is smaller and has considerably smaller teeth. They should be considered the western and insular representatives of the very large *coenororum* occurring in the Idenburg area and along the east side of Geelvinck Bay.

The general color is brownish fuscous, the hair soft in young animals, quite bristly spinous in old ones. The color of the under side is dirty white, the bases of the hairs are grayish. Hands and feet with fine whitish hairs. Tail dark gray, slightly paler beneath. Mammary formula, as in *ruber*, 2-2=8.

Rattus ruber coenororum Thomas

Rattis coenororum THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 262; 1922, Nova Guinea, vol. 13, p. 727.

Rattus bandiculus THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 262.

TYPES: Of *coenororum*, B.M. No. 22.2.2.19, young adult male, from Pionier Bivak, Mamberano River, 200 feet, collected by W. C. Van Heurn, Buitenzorg Museum, December 18, 1920. Of *bandiculus*, B.M. No. 22.2.2.22, old male, same data. Ellerman considers the two synonymous.

MATERIAL: Hollandia, Cyclops Mountains, and Sentani Lake (three adjoining localities), nine; Idenburg River, 75 meters, one; same, 850 meters, two; same, 1200 meters, four; same, 1500 meters, one (all south of the river and near Bernhard Camp).

Pelage of type of *coenororum* with mixed spines and few wool hairs. Long, terete guard hairs. Dark grayish brown above. Under parts with the spinous hairs white to their bases, and a mixture of short pale gray wool hairs. Hands and feet pale gray. Fingers and toes white. Tail scales 10 per centimeter.

The color of the type of *bandiculus* is much as in *coenororum*. The chest and neck have a brownish wash. Tail scales eight per centimeter.

This race is probably the largest *Rattus* in New Guinea. So large is the male specimen

that Thomas designated as the type of *bandiculus* that he was moved to differentiate it from the type of *coenororum*, though both were collected at the same place and on the same date. We have among our specimens some that are very nearly as large as *bandiculus*.

Rattus ruber tramitius Thomas

Rattus mordax tramitius THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 262.

Rattus leucopus utakwa RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 115.

TYPES: Of *tramitius*, B.M. 22.2.2.13, adult female, from Dormanpad Bivak, Mamberano River, 1410 meters, collected October 15, 1920, by W. C. Van Heurn. Of *utakwa*, B.M. No. 13.6.18.65, adult male, from Camp No. 3, Utakwa River, 2500 feet, collected November 23, 1912, by C. B. Kloss.

MATERIAL: Balim River, near Lake Habbema, 1600 meters, 49; Bele River, 2200 meters, 80; 9 kilometers northeast of Lake Habbema, 2800 meters, 19. This fine series, totaling 148 specimens, amply represents this mountain-dwelling race.

Occasionally specimens (including the type of *utakwa*) occur with symmetrical white marks on the back and sides. There are frequently white chest marks. This mountain species is consistently of smaller size than the large *coenororum* from the lowland country north of its habitat. The race *tramitius* most nearly resembles the small eastern race *mordax* but has denser pelage.

Rattus ruber steini Rümmler

Rattus leucopus steini RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 115.

TYPE: Berlin, No. 45676, adult male, from Kunupi Mountain, Weyland Mountains, western Netherlands New Guinea, collected October 5, 1931, by G. Stein.

MATERIAL: A.M.N.H. No. 101964, female, from Gebroeders, Weyland Mountains, 5000 feet (formerly identified as *tramitius*).

"Skin soft, not bristly. Above mixed yellow brown and black, the total result dark brown. Underside dark gray washed with yellowish . . . Tail unicolor . . . scales 11 per cm."

This form appears very closely related to *tramitius*.

***Rattus ruber hageni* Troughton**

Rattus mordax hageni TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 120.

TYPE: Sydney, No. M.6102, adult male, with allotype, No. M.6103, from upper Waghi River, south slopes of Mt. Hagen, south of Sepik Division, Territory of New Guinea.

It appears possible that this race is continuous in distribution with the foregoing race *tramitius*. I cannot prove the case either way, but the color distinctions brought out by Troughton do not appear very convincing. There exists no "barrier" which would prevent continuous distribution along the mountains at 6000 feet.

It is also possible, as the mammary formula of this animal is still unknown, that *hageni* may be a race of *verecundus* of the *leucopus* group.

***Rattus ruber purdiensis* Troughton**

Rattus purdiensis TROUGHTON, 1946, Rec. Australian Mus., vol. 21, p. 408.

TYPES: Sydney, No. M.7183, adult male, with allotype, No. M.7184, from Bat Island, Purdy group, 70 miles south of the Admiralty Islands, collected by Lieut. D. C. Swan.

This appears to be related to *praetor* and *mordax* rather than to the more heavily spined western subspecies. Troughton described it as having even softer pelage than *praetor* and *mordax*. Until detailed studies have been made of the effects of seasons on the molt of all these tropical rats, we shall not be in a position to decide whether such distinctions are truly valid or not.

***Rattus ruber mordax* (Thomas)**

Mus mordax THOMAS, 1904, Ann. Mag. Nat. Hist., ser. 7, vol. 14, p. 398.

TYPE: B.M. No. 4.8.3.1, old female, from Kumusi River, Northern Division, Papua (longitude 148° 20' E., latitude 8° 30' S.), 565 feet, collected November 14, 1903, by C. A. W. Monckton. Back of skull broken.

The astronomical position and altitude both appear on the type label and presumably were supplied by Monckton. The former indicates approximately the mouth of the

Kumusi River. The altitude of 565 feet may mean either high land near the sea or a locality some long way up river. I am disposed to view the second possibility as more likely, since the type specimen is in very close agreement with Archbold material from the Astrolabe Mountains, but is definitely smaller and more lightly built than specimens taken in the Dobodura area by the United States Typhus Commission.

MATERIAL: Near Dobodura, collected by United States Typhus Commission (U.S.N.M. Nos. 290342-290344), three, skulls badly broken. Also Kokebagu, near Kapa Kapa, Kemp Welch River, 34; Sogeri, 24; Itiki, six; Baruari, five (these three localities are close together in the Astrolabe Mountains, 1200 feet); Rona, near Sogeri, 700 feet, three; Kagi, Moresby-Kokoda track, 5000 feet, three; Mafulu, Angabunga River, 18; Baroka, seven; Mt. Tafa, one.

Color of type grayish brown above, with flat spines and terete guard hairs. Beneath self-colored buffy white, the throat pale brown. Hands and feet brownish buff. Tail scales nine per centimeter.

I have been unable to distinguish in any way between our big series from the Astrolabe Range and the few specimens I have seen from the northeast of New Guinea away from the coast. I think there is unquestionably environmental continuity between 500 to 2000 feet around the eastern end of the Central Range. The extent of *mordax* westward, south of the mountains, appears to be limited; at least, none were taken in the Fly River headwaters. Adults commonly have fruit stains on the neck and chest, as have the representatives of the Astrolabe race of *leucopus*.

The three specimens taken by the United States Typhus Commission are considerably larger and coarser-haired than typical *mordax*. They more nearly resemble the western forms *ruber* and *coenorhynchus*, both of which also live in the lowlands. It is possible that the larger-sized rats of this species occur near sea level all along the north and northeast coasts. Compare measurements in table 5. Note how greatly the male exceeds the female (mammary 2-2 = 8) in size. The second female is younger and smaller but has the same mammary formula.

***Rattus ruber praetor* (Thomas)**

Mus praetor THOMAS, 1888, Proc. Zool. Soc. London, p. 481.

TYPE: B.M. No. 88.1.5.39, adult female in alcohol, skull cleaned, from Aola, Guadalcanar, collected by C. M. Woodford.

MATERIAL: A paratype, B.M. No. 88.1.5.38, adult male.

Pelage rather soft, with abundant flat spines and some longer terete guard hairs. Under parts dirty white; hands and feet white; terminal 10 mm. of tail white. Tail scales 10 per centimeter. Mammary formula, $2-2=8$.

This was one of the earliest rats to be described from the Papuan region. It was preceded only by *ruber*, which was made known by Jentink in 1879. It is clearly a colonizer from the mainland and probably derived directly from *mordax*. Unless it was transported, with *mediocris*, by native canoes, we may expect that it traveled by way of New Britain, and we may suspect the presence of a member of the species from that island.

***Rattus ruber mediocris* Troughton**

Rattus praetor mediocris TROUGHTON, 1936, Rec. Australian Mus., vol. 19, p. 343.

TYPE: Sydney, No. M.5761, adult male, from Buin, Bougainville Island, Solomon Islands, collected by the Rev. J. B. Poncetlet.

MATERIAL: Troughton recorded also two male paratypes, Sydney, Nos. M.5769 and M.5770. We have a single specimen in alcohol from Bougainville.

I find little difference between *mediocris*, *praetor* of Guadalcanar, and *mordax* of the New Guinea mainland. Frechkop (1949) considered them identical. Troughton compared *mediocris* with *praetor*. He regarded it as warmer colored, and somewhat larger, with shorter ears, longer tail, longer palatal foramina, and larger molars.

***Rattus ruber rosalia* Hinton**

Rattus rosalia HINTON, 1943, Ann. Mag. Nat. Hist., ser. 11, vol. 10, p. 557.

TYPE: B.M. (Shaw Mayer) No. 588, female, from upper Ramu Plateau, northeast New Guinea, 6000 feet, collected April, 1940, by F. Shaw Mayer.

Hinton described this rat as "very similar

to *leucopus* [*sensu lato*] but so much smaller than the smallest race of that species that it seems to warrant specific recognition . . . mammae, $2-2=8$." Hind foot, 25 to 29 mm.

I examined the type of this rat in London recently (1950). It appears to be a highland representative of the lowland *mordax*. The tip of the tail is possibly defective. The dorsal color appears exactly as in *mordax*. The hairs of the under parts are wholly gray-based. The mammary formula, $2-2=8$ (as given by Hinton), is in agreement with the formula of the *ruber* group, in which the form is now placed.

**THE *Rattus leucopus* GROUP, INCLUDING
TYPICAL *Stenomys***

I find only two full species, both of them with mammary formula $1-2=6$, referable to the present group. These are *leucopus*, to which a considerable number of former "species" are now referred as geographical races, and the sympatric, slightly smaller species *verecundus*. *Rattus verecundus* was formerly set off as the type of the "genus" *Stenomys*, but it appears to me, as it did to Rümmler, far more closely allied to *leucopus* than such generic separation would imply.

The range of *R. leucopus* with its subspecies includes the whole of forested south New Guinea up to 3000 feet and the whole of the Cape York Peninsula and parts of New Guinea north of the Central Range, particularly at the eastern end (race *dobodurae*). The range of *R. verecundus* appears to be limited to an altitudinal zone in rain forest, between 1000 and 5000 feet above sea level, which runs around the entire New Guinea mountain system.

The constant differences between the two species are of a very minute order though their occurrence, at least in the Astrolabe Mountains, is in seemingly identical environment. There seems to be good reason to consider *leucopus* and *verecundus* sympatric species.

***Rattus leucopus* (Gould)**

This rain-forest-inhabiting member of the *R. assimilis-ruber-leucopus* division is distinguished from the other large-sized species by the reduction of the mammary formula in females to $1-2=6$. Its geographical distribu-

tion is, in general, the southern half of New Guinea (with some extension around the east end of the great central backbone of mountains traversing that island), and the eastern side of Cape York Peninsula about as far south as Cairns.

All the races of *R. leucopus* but two have self-colored hairs (white or buffy white) on the ventral surface and the tail white distally and slightly longer than the head and body. The exceptions are *R. l. cooktownensis* and occasionally individuals of *ringens*. Most have channeled, spinous pelage, with few wool hairs. Again *cooktownensis* is exceptional. The skull is distinctly long-snouted, as is that of the related *assimilis* group, for both have the rostrum slightly longer than at least the eastern members of *ruber* (*sensu lato*).

The races of *Rattus leucopus* are here recognized as:

<i>dobodurae</i>	Eastern New Guinea, both north and south of the mountains. I refer our Astrolabe series to Troughton's race
<i>owiensis</i>	Eastern Schouten Islands. This is exceptionally far west from Dobodura, eastern New Guinea, where the nearest ally occurs
<i>ringens</i> (=rat-ticolor)	Eastern parts of Netherlands New Guinea, south of the mountains; the upper Fly River basin
<i>doboensis</i>	Aru Islands and south New Guinea. Common in gallery woods along streams crossing grasslands
<i>leucopus</i>	Cape York Peninsula from the extreme tip to Iron Range
<i>mcilwraithi</i>	McIlwraith Range, Cape York Peninsula
<i>cooktownensis</i>	Cooktown to just north of Cairns, Cape York Peninsula

The three races of *R. leucopus* found on the Cape York Peninsula are distinguished from *R. assimilis*, the species that occurs south of Cairns, not only by their differing mammary formula (1-2=6 compared with 1-3=8 or 2-3=10) but also by their considerably lower zygomatic plate and shorter incisive foramina. Externally most are strongly spinous and generally light colored, in contrast to the long-haired, dark-colored *assimilis coracius*. This is true with the exception of the somewhat annectant *R. l. cooktownensis*, which superficially resembles *coracius*.

Rattus leucopus leucopus (Gould)

Acanthomys leucopus GOULD, 1867, Proc. Zool. Soc. London, p. 508.

Mus terraereginae ALSTON, 1879, Proc. Zool. Soc. London, p. 646.

TYPE: B.M. No. 67.5.6.4, adult female in alcohol, Cape York, Cape York Peninsula, northern Queensland, purchased from Higgins. The same is marked as type of *terraereginae*. B.M. No. 67.5.6.3, young male, from River Damon was chosen by Thomas as "lectoparatype."

MATERIAL: Lockerbie area, within a few miles of the tip of Cape York Peninsula, 120 (thus virtual topotypes); Cape Grenville (C.N.H.M.), one; Portland Roads, six; Iron Range and Mt. Tozer, 27; Brown's Creek, Pascoe River, west of Iron Range (taken by Mr. Vernon of the Queensland Museum), one.

The type specimen of *leucopus* (and *terraereginae*) is exceedingly like *ringens* of south New Guinea but slightly darker in color. It is strongly spinous. The dorsal pelage is rather long; the ventral, short. Tail scales eight per centimeter. In Thomas' lectoparatype the tail has eight scales per centimeter and scale hairs one to one and one-fourth scale lengths.

Skull of type with elongate muzzle, rather narrow braincase, the nasals surpassing the premaxillae anteriorly; incisive foramina rather long, broad, pointed in front, slightly rounded behind; zygomatic plate broad, straight in front; dental palate rather broad; incisors opisthodont; molars smaller than those of the type of *ringens*.

The material secured by the Archbold expedition is quite varied in color, possibly owing to wear and a degree of bleaching. Many of the older rats have the channeled spines of the back colored rusty red from the lateritic earth and ironstone of the forest soils in which they make their holes. Younger specimens rarely showed this condition. At Lockerbie, the rats were common among tumbled masses of ochraceous ironstone over which grew the rain forest.

In the Iron Range area, this rat rarely showed any red on its spines, as most specimens were taken in hillside rain forests or in riverside flood forest.

Rattus leucopus mcilwraithi, new subspecies

TYPE: A.M.N.H. No. 153968, adult male,

from upper Nesbit River (Rocky Scrub), 1500 feet, 20 miles east of Coen, Cape York Peninsula, collected April 17, 1948, by G. H. H. Tate.

GENERAL CHARACTERS: A small-sized, soft-haired race of *leucopus* which occurs in two forms: one with ventral hair bases white to roots, the other with gray-based ventral hairs. There are numerous intermediate specimens in which the gray-based hairs occupy part of the under surface but do not completely replace the all-white areas. The type is chosen from among the white-based specimens.

DESCRIPTION OF TYPE: Color a mixture of tawny and black, generally more tawny than true *leucopus*. Channeled spines generally weaker. Under parts rather soft-haired, the hairs white to the roots. Minute hairs of hands and feet white. Tail gray brown, the terminal 45 mm. white; the scales eight per centimeter, scale hairs one to one and one-fourth scale lengths.

Skull essentially as in *leucopus*, slightly smaller.

MEASUREMENTS OF TYPE: Skin (field measurements): head and body, 170 mm.; tail, 170; hind foot (s.u.), 38; ear from crown, 21. Skull: greatest length, 41.8; condylobasal length, 39; zygomatic breadth, 20; nasals, length, 15.4; greatest width, 4.5; interparietal, 8.5; palatal length, 22; incisive foramina, 6.7 by 3.1; length of bulla, 7.3; m^{1-3} , 6.6; m^1 , 3.0 by 2.0; m^2 , 1.8 by 2.0; m^3 , 1.6 by 1.6.

The ample series representing this race comes from the following places in the McIlwraith Range: the type locality (eastern drainage), 22; Camp Oven Pocket, 1500 feet, six; Shepherd's Battery Site, upper Peach River, four (both western drainage). In addition to the foregoing I have examined a short series taken in the same range by P. G. Darlington of the Museum of Comparative Zoölogy: Peach River (Rocky Scrub), three; and Llanckelly Scrub, at the head of the Coen River (the valley to the south, adjoining the Peach River), three. Only one of the six has gray-based hairs; it is from the Peach River.

The light and dark-bellied forms occur in about equal numbers in the Nesbit River station and at Peach River. Only one of the six at Camp Oven Pocket has the gray-based under hairs. There is general uniformity of

skull characters throughout the series, with a degree of variation both in the length of the bulla and in the size of the molars.

***Rattus leucopus cooktownensis*, new subspecies**

TYPE: A.M.N.H. No. 153986, old male, from Shipton's Flat, 30 miles south of Cooktown, north Queensland, 900 feet, collected September 5, 1948, by G. H. H. Tate.

GENERAL CHARACTERS: An exceptionally dark-colored race of *Rattus leucopus* provided with relatively soft, non-spinous pelage which presents a close resemblance to that of *R. assimilis coracius*. It is distinguished, however, by skull characters and the differing mammary formula of *leucopus*.

DESCRIPTION OF TYPE: Dorsal color of pelage a mixture of gray and tawny, the bases of the hairs slate-colored, the sides a little browner than the back. Under parts with the rather long hairs buffy at the tips, their bases gray. Hands and feet with fine yellowish white hairs. Tail brownish gray above and below. Tail scales 11 per centimeter, scale hairs nearly two scale lengths.

Skull of the type with the elongate rostrum of *leucopus* and *assimilis*, the zygomatic plate lower than in *assimilis*. Other characters as in *leucopus*.

MEASUREMENTS OF TYPE: Skin (field measurements): head and body, 185 mm.; tail, 180; hind foot (s.u.), 39; ear from crown, 20. Skull: total length, 44.6; condylobasal length, 42.3; zygomatic breadth, 21.0; nasals, length, 16.6; greatest breadth, 5.5; interparietal, 11.7; breadth of zygomatic plate, 4.4; palatal length, 24.4; incisive foramina, 7.3 by (greatest breadth) 4.0; length of bulla, 6.9; m^{1-3} , 6.0; m^1 , 3.0 by 1.8; m^2 , 1.7 by 1.8; m^3 , 1.6 by 1.5. Teeth considerably worn.

The series of this new race, which comes typically from Shipton's Flat and near-by Rossville Creek at the western foot of Mt. Finnegan, 2600 to 2900 feet, differs in no appreciable way from the first. Others referable to *cooktownensis* include: Mossman Gorge, 20 miles north of Cairns, 13; Julatten, 1000 feet, above Mossman, six; upper Clohesy River, tributary of Barron River, northern parts of Atherton Tableland, 18; Danbullan, same area (C.N.H.M.), one.

In all this material adventitious pure white marks on the under parts appear in only four

specimens, three from the upper slopes of Mt. Finnegan, one from Mossman Gorge. This contrasts with the appearance of such marks in nearly 50 per cent of *R. assimilis coraciis*.

***Rattus leucopus ringens* (Peters and Doria)**

Mus ringens PETERS AND DORIA, 1881, Ann. Mus. Civ. Genova, vol. 16, p. 700.

Mus ratticolor Jentink, 1909, Nova Guinea, vol. 9, p. 7.

TYPES: Of *ringens*, Genoa, No. C.E.3460, adult female in alcohol, skull cleaned, from the Fly River, south New Guinea, collected by D'Albertis. Of *ratticolor*, Leiden, field no. 84, young female (m_3^8 but newly in place), from Van Weil's Camp, junction of Reiger and Lorentz rivers, southwest Netherlands New Guinea, in dense forest, collected June 28, 1907, by the Lorentz New Guinea expedition.

MATERIAL: Upper Fly River, Papua, at the following places: latitude $6^{\circ} 50'$ S., right bank, two; mouth of Black River, two; Oroville Camp, five; Sturt Island Camp, 52 (and two in alcohol). Total, 63. Also Mimika River (C.N.H.M. No. 35297), one.

The type of *ringens* agrees in all details with our large series above. The general color is a mixture of tan and blackish gray (the latter caused partly by fuscous guard hairs and partly by the light gray bases of the spines). The under parts are white or buffy white to the base of the hairs. Mammæ, 1-2=6. The skull (broken) is long-snouted, the nasals surpassing the premaxillae anteriorly. The incisive foramina are elongate but not slit-like; the bullae small. Teeth of medium size.

The type of *ratticolor* is colored brownish fuscous above, dull white (gray-based hairs) beneath. The terminal half of the tail is whitish. Hands and feet grayish white. Tail scales 11 per centimeter (youth). Scale hairs three-fourths of one to one scale length. Skull with full braincase of a juvenal animal and bullae comparatively large. Front of skull broken, but rostrum elongate. Nasals surpassing premaxillae. Molars heavy and relatively broad; with m_3^8 newly in place.

I have checked the measurements of the type of *ringens* against our upper Fly River series (larger and darker) and our lower Fly River and Oriomo series (smaller and paler).

It is my conclusion that the type more nearly resembles the former. The type label is marked merely "Fly River." This apparently causes *ratticolor* to become a synonym of *ringens*.

[*Rattus leucopus doboensis* (De Beaufort)]

Mus doboensis DE BEAUFORT, 1911, Abhandl. Senckenbergischen Naturf. Gesellsch., vol. 34, p. 112.

TYPE: From Aru Islands. Presumed to be at Frankfort. Not seen.

MATERIAL: At Genoa, under No. C.E.3244, are six specimens referable to this species, collected by Beccari, at Wokan, Aru Islands, wrongly marked "*Uromys*." They very strongly resemble the race of *leucopus* present in the gallery woods of the near-by mainland savanna country. Also Wassi Kussa, south coast of New Guinea, 54; Oriomo River, five; Mabaduane, south coast, 11; Old Mawatta, opposite Daru Island, two; Gaima, north bank, Fly River estuary, one; Lake Daviumbu, middle Fly River, one. Total, 84 mainland specimens.

This race is paler and a little smaller than the race *leucopus* of the tip of Cape York Peninsula, to which it is most closely allied. Its range northward seems to be limited by the east-west course of the lower Fly River. It reaches Lake Daviumbu. Westward it probably extends at least to Merauke. *Rattus l. doboensis* is replaced in the north (middle and upper Fly River) by the larger and darker race *ringens* (= *ratticolor*). The break between the two races probably coincides with the change from predominantly open forest to predominantly rain forest (Rand and Brass, 1940, map).

The large, dark-colored rats of this race stand in sharp contrast to the smaller, lighter-brown members of the race *doboensis* from Aru Islands and the southern parts of New Guinea adjoining Australia. They more nearly resemble our examples of the next race, *doboduræ*, which is typical of the northeast coast but also extends along the south side of the Central Range to the Port Moresby area. The two may ultimately be proved to be confluent in the region behind the Gulf of Papua. At present the western race *ringens* seems to have somewhat browner, the eastern race

dobodurae somewhat whiter, under parts. Both are larger than *doboensis*.

***Rattus leucopus dobodurae* Troughton**

Rattus ringens dobodurae TROUGHTON, 1946, Rec. Australian Mus., vol. 21, p. 407.

TYPE: Sydney, No. M.6960, male, and a female, No. M.6987, from Dobodura, Northern Division of Papua, collected by United States Typhus Commission (not examined by me in Sydney).

MATERIAL: Sogeri, 29; Baruari, 17; Itiki, 11; Rona, 15 (all localities close together in the Astrolabe Mountains). Total, 72.

I can find no characters to distinguish the series of rats from the Astrolabe Mountains from typical *dobodurae*. The animals are strongly spinous, and adults frequently have the throat and chin marked with fruit stains, as in *R. mordax*. It seems likely that this race will be found to unite through the forests north of the Gulf of Papua with the very similar western race *ratticolor*. Mammary formula, 1-2=6.

The Astrolabe animals were first collected at Gerekanumu, near Port Moresby, by Loria and identified by Thomas (1897) as "*Mus terrae-reginae*," a very accurate identification. Some years later Thomas (1904) recorded near topotypes of *dobodurae* from latitude 8° 30' S., longitude 148° E., collected by Monckton, under the name *ringens*, again a close identification.

Three specimens (one male, two females) from near Dobodura, collected by the United States Typhus Commission and lent to me for study are not the *dobodurae* of Troughton. Instead they are referable to *mordax* of the *ruber* group. They have the mammary formula 2-2=8, the tail without white tip and shorter than the head and body. This follows Troughton's own key (p. 407) in which he shows that *mordax* has "tail shorter, unicolor blackish . . . mammae 2-2=8."

***Rattus leucopus owiensis* Troughton**

Rattus owiensis TROUGHTON, 1945, Rec. Australian Mus., vol. 21, p. 374.

TYPES: Sydney, No. M.6993, young male, with allotype, Sydney, No. M.6992, adult female, both from Owi Island, eastern Schouten group, off the mouth of the Sepik River, northeast New Guinea.

I have placed *owiensis* in this position in the system chiefly because its mammary formula is in agreement with that of the *leucopus* group. Its type locality is rather far to the north to fit the seeming distributional pattern of *leucopus*. Possibly it belongs instead with *verecundus*, the next species following.

***Rattus verecundus* (Thomas)**

For a time I thought that *verecundus* might represent merely a growth stage of *R. leucopus dobodurae*. The species occurs with *leucopus dobodurae* and *ruber mordax* in the rain forests on the top of the Astrolabe Range, under seemingly identical ecological conditions. However, it is more slenderly built than *R. l. dobodurae*, even though it possesses essentially similar skull structure and the same mammary formula. The throat and chest are never colored russet, presumably by food stains, as are those of *dobodurae*.

It is necessary to recognize this rat as a full species, sympatric with, and most closely allied to *R. leucopus*, but a little smaller. Its range appears to be far more restricted than that of *leucopus*, as it is found only on the north and south slopes of the great Central Range and its outlying spurs (including Saruwaged).

This species of "*Stenomys*" was divided by Rümmler (1938, p. 193) and by Ellerman (1941, p. 205) into four races: *unicolor* from the Weyland Mountains, 5000 to 6000 feet, *verecundus* from the mountains behind Port Moresby, 2000 to 5000 feet, *försteri* from the Saruwaged Mountains, 5500 to 6500 feet, and *mollis* from Mt. Misim, 5800 feet. Externally these rats appear like somewhat smaller, softer-haired examples of *dobodurae*, the race of *Rattus leucopus* that occurs in the forests of the Astrolabe Mountains. The skulls are smaller and narrower, but have similarly large incisive foramina. On the other hand these rats also somewhat resemble the still smaller "*Stenomys niobe*" group of *Rattus*, which in general inhabits much higher altitudes. From that group they can be distinguished by their longer incisive foramina and bullae and larger teeth.

I find very little difference between *verecundus*, *försteri*, and *unicolor*. The last has slightly softer hair with more brown in it. *R. v. mollis*, on the other hand is considerably

smaller in size, both as to foot length and to length of tooth row. The elongate incisive foramina in *verecundus* seem to preclude close relationship to *R. niobe*.

***Rattus verecundus verecundus* (Thomas)**

Stenomys verecundus THOMAS, 1904, Novitates Zool., vol. 11, p. 598.

TYPE: B.M. No. 3.12.1.1, old female, from Avera, Aroa River, Papua, collected May 31, 1903, by A. S. Meek.

MATERIAL: Matsika, Angabunga River, one; Mafulu, one; Itiki, one; Baruari, three; Sogeri, two (the last three localities on the Astrolabe Mountains at 2000 feet); Kagi, Kokoda road, 5000 feet, three.

A slender rat, with dorsal color dark brownish gray; some weak, flat spines in the dorsal pelage; under parts buffy white with gray bases, rarely with an all white mark on chest. Tip of tail often white. Tail scales about 13 per centimeter. Mammary formula, 1-2=6.

Profile of skull from tip of nasals to middle of parietals very flat. Rostrum elongate and narrow, and nasals markedly exceeding premaxillae. Bullae and teeth small.

***Rattus verecundus försteri* (Rümmeler)**

Stenomys verecundus försteri RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 117.

TYPE: Leiden, No. 292/2, adult female, from source of Bulung River, Saruwaged Mountains, 1800 to 2000 meters, collected by Förster. Rümmeler distinguished this race from *mollis* by body and skull size and narrow incisive foramina, from *verecundus* by narrow incisive foramina, from *unicolor* by the broader zygomatic, narrower interorbital region, and paler under parts. He listed additional material.

***Rattus verecundus mollis* (Rümmeler)**

Stenomys verecundus mollis RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 116.

TYPE: M.C.Z. No. 29905, adult female, from Morobe, Mt. Misim, 5850 feet, collected April 14, 1933, by H. Stevens.

Dorsal color of the type gray, virtually without brown; the spinous hairs weak. Under parts grayish white, the hairs with dark gray bases. A small white spot on chest.

Tail not lighter beneath, its terminal 30 mm. white. Scale rings 10 per centimeter, the hairs about one scale length.

Skull and rostrum elongate and narrow. Zygomatic plate sloping, rather narrow. Incisive foramina large, broad, pointed in front, rounded behind. Bullae small.

***Rattus verecundus unicolor* (Rümmeler)**

Stenomys verecundus unicolor RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 117.

TYPE: Berlin, No. 45678, adult male, from Kunupi Mountain, Weyland Mountains, 1400 to 1800 meters, western Netherlands New Guinea, collected by George Stein, September 11, 1931.

MATERIAL: Two of Stein's series.

Compared with true *verecundus* of southeast New Guinea this form appears smaller, more touched with brown, and with darker under parts. The skull differs in no important way.

THE *Rattus niobe* GROUP, FORMERLY REFERRED TO "*Stenomys*"

With the exception of *R. richardsoni*, members of this group are small rats of the general size of members of the *R. exulans* division. They have extremely soft pelage and occur high in the mountains of New Guinea. The mammary formula, so far as I can determine, is 1-2=6, just as in the *leucopus* group of larger-sized *Rattus*.

In the little-specialized skull the rostrum is long and slender, the zygomatic plate narrow and sloping. The affinities of the group appear to be with the larger-sized *leucopus-verecundus* group. Formerly these little rats were linked to *R. verecundus* under the common generic name "*Stenomys*." They appear also to be allied to the newly described and considerably larger *R. richardsoni*.

The *R. niobe* group should be compared with the Papuan members of the *R. exulans* division. Apart from their similar body size, the two are easily distinguished. *R. niobe* is primarily a mountain species; *R. exulans* (*browni* and forms) is primarily of the lowlands, but reaches at least 5000 feet. *R. niobe* is dark-colored and fine-haired; *R. exulans* is pale brown and relatively coarse-haired. The rostrum and especially the nasals of *R. niobe* are much lengthened, normal in *exulans*. The

bullae in *niobe* is quite small in relation to the length of m^{1-3} ($\pm 9: \pm 10$); in *exulans* the bulla is larger proportionately ($\pm 12: \pm 11$). The mandible in *niobe* is weak and shallow; in *exulans* it is normally deep in proportion to its length. The zygomatic plate is quite narrow in *niobe* (2.5 mm.); normally broad in *exulans* (3.5 mm.). The mammary formula in *niobe* is 1-2=6; in *exulans*, 2-2=8.

Our extensive collections in the *R. niobe* group from the Snow Mountains northward to the upper parts of the south slopes of the Idenburg River indicate the presence of a dense population of these rats at the higher levels.

Under Rümmler's (1938, pp. 199-200) classification three races of *niobe* have blackish pelage; two have "uniformly" blackish brown fur, and one, *arrogans* from Dormanpad Bivak, 2400 meters, has "finely mixed dark brown and blackish brown" fur. The two first named are *klossi* (= *haymani*) and *clarae* (= *pococki*), respectively from the Utakwa River, 1800 meters, and the Sumuri Mountains, 2500 meters. My notes on the types indicate that *haymani* and *arrogans*, while dark colored, are still to be regarded as brown forms not very different from true *niobe* and *stevensi*, and that *pococki* is the only really blackish race.

The measurements of the types and of series picked from our ample material show how closely most of the forms are linked together. The only outstandingly different race is *R. n. arfakiensis*, in which the large incisive foramina are 6 mm. in length. The others are so closely allied that they show only minor variations, such as cranial dimensions, the black pelage of *pococki*, the longer pelage of the strains inhabiting very high altitudes.

The midmontane, somewhat short-haired form (from Kagi, 4700 feet) appears almost inseparable from the small series from the Balim Valley (5000 feet). In the same way the long-haired animals from high on Mt. Albert Edward appear indistinguishable from the great series found at Mt. Wilhelmina and northward to Lake Habbema. The blackish race *pococki* occurs on the north and west slopes of the Central Range in Netherlands New Guinea. The *R. niobe* group, taken as a whole, seems to be confined to altitudes above 4000 feet in the New Guinea mountains.

Rattus niobe niobe (Thomas)

Mus niobe THOMAS, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 327.

TYPE: B.M. No. 5.11.28.7, young adult female, from Owgarra, Angabunga River, Papua, collected November 15, 1904, by A. S. Meek.

MATERIAL: Mt. Albert Edward and Mt. Tafa, 9000 to 12,000 feet, ± 90 .

Color of the type dark brown with a wash of rufous above, the fine pelage lacking spines; under parts with brownish buff hair tips, the bases fuscous. Hands white, feet grayish white. Length of tail hairs about two scale lengths, scales 15 per centimeter. Skull with full braincase, quite short incisive foramina, and rather small bullae.

This form was the first of the *niobe* group to be described. It was later placed with *verecundus* in the genus "*Stenomys*." There appear to be insufficient characters to maintain *Stenomys* as a genus distinct from *Rattus*.

Rattus niobe pococki Ellerman

Stenomys niobe clarae RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 118 (preoccupied).

Rattus niobe pococki ELLERMAN, 1941, The families and genera of living rodents, vol. 2, p. 206, footnote (new name).

TYPE: Berlin, No. 45679, adult female, from Sumuri Mountains at 2500 meters, collected September 3, 1931, by Georg Stein.

MATERIAL: Mountains south of the Idenburg River at 1800 to 2150 meters, 67.

This almost melanistic race is distinguished chiefly by its color, blackish brown above and very dark gray beneath. The tail, hands, feet, and ears are fuscous. Mammary formula, 1-2=6. The skull differs in no pronounced way from that of *niobe*.

[*Rattus niobe haymani* Ellerman]

Stenomys klossi THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 207 (preoccupied).

Rattus niobe haymani ELLERMAN, 1941, The families and genera of living rodents, vol. 2, p. 206 (new name).

TYPE: B.M. No. 13.6.18.83, adult male, from Camp No. 9, upper Utakwa River, 5500 feet, collected February 1, 1913, by C. Boden Kloss.

Dorsal color dark grayish brown. A few

slightly stiffened guard hairs dorsally. Under parts whitish gray. Fingers and toes white. Scale hairs of tail two to two and one-half scale lengths. Palatal foramina slightly wider and zygomatic plate narrower than in true *niobe*.

Geographical continuity with *niobe*, to which it is most closely allied, along the south slopes of the Central Range is to be presumed.

[*Rattus niobe arrogans* Thomas]

Stenomys arrogans THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 263.

TYPE: B.M. No. 22.2.2.24, adult female, from Dormanpad Bivak, 2400 meters, collected October 31, 1920, by Van Heurn.

MATERIAL: Mt. Wilhelmina-Lake Habema area at the following altitudes: 2200 meters, 47; 2700 to 2800 meters, 85; 3225 meters, 202; 3500 to 3600 meters, 131; 3800 to 4000 meters, 35; also 10 in alcohol. Total, ± 500 .

All the individuals of this great series bear very long, soft pelage, usually grayish brown but more blackish in a very few. The under parts are light gray, fuscous based, and lightly washed with pale brown. The skulls average very slightly larger than those of *pococki* and midmontane *haymani* and *niobe*. This difference in size shows well in the length of the bulla and the width of the zygomatic plate. The race is probably widely distributed over very high country.

[*Rattus niobe stevensi* (Rümmeler)]

Stenomys niobe stevensi RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 117.

TYPE: M.C.Z. No. 29915, adult male, from Mt. Misim, 7000 feet, near Morobe, northeastern Papua, collected January 16, 1933, by H. Stevens.

Dorsal color of type dark gray tinged with brown. Ventral color gray, with darker bases. Hands and feet grayish white. Tail fuscous, not paler beneath, and the tip not white. Scale rings 14 per centimeter and hairs one and one-half scale lengths.

Skull elongate. Zygomatic plate sloping, quite narrow, and slightly curved. Incisive foramina narrow, pointed in front.

Rattus niobe rufulus (Thomas)

Stenomys rufulus THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 669.

TYPE: B.M. No. 28.10.1.34, adult female, from the highest points of the Saruwaged Mountains, 4000 meters, collected by C. Keysser, August, 1914. Skin in bad condition and possibly subjected to some treatment that intensified the red coloring.

Dorsal color of type dull cinnamon, the hair long and dense, with the few guard hairs essentially like those of *haymani*. Under parts dull reddish brown, with gray hair bases. Hairs of feet brown; of hands and toes white. Teeth exceptionally small.

Rattus niobe arfakiensis (Rümmeler)

Stenomys niobe arfakiensis RÜMMLER, 1935, Zeitschr. f. Säugetierk., vol. 10, p. 118.

TYPE: B.M. No. 29.5.27.36, adult female, from Arfak Mountains, 2000 meters, collected by F. Shaw Mayer, August 21, 1928.

Pelage gray brown above, much as in true *niobe*; under parts grayish white, with fuscous hair bases. Tail scales 15 per centimeter, the scale hairs two scale lengths. The skull distinguished chiefly by the length of the incisive foramina, which more nearly approximate those of *R. verecundus* than any other race of *niobe*. The length of the skull is greater than in most other races.

Rattus shawmayeri Hinton

Rattus shawmayeri HINTON, 1943, Ann. Mag. Nat. Hist., ser. 11, vol. 10, p. 556.

TYPE: B.M. No. (field) 636, female, from Baiyanka, Purari-Ramu Divide, northeast New Guinea, 8000 feet, collected by F. Shaw Mayer.

Hinton regards this species as "totally unrelated to any hitherto described from New Guinea, and superficially most like *Rattus eha* of the eastern Himalayas." Very small. Fur soft, dark brown; belly whitish gray. Tail very long, with tip white. About 14 rings per centimeter. Bullae small, supra-orbital ridges weak, palatal length less than half of the occipito-nasal length, incisive foramina long.

Hinton distinguished *shawmayeri* from the *exulans* group but did not compare it with any relative of *niobe*. Only the type is known.

***Rattus richardsoni* Tate**

Rattus richardsoni TATE, 1949, Amer. Mus. Novitates, no. 1421, pp. 1-3.

TYPE: A.M.N.H. No. 150701, adult male, near Lake Habbema, 3225 meters, collected August 2, 1938, by W. B. Richardson.

MATERIAL: A series of 56 specimens from altitudes between 3560 and 4050 meters in the Lake Habbema-Mt. Wilhelmina area.

A large, long-haired, tawny brown species, the under parts buffy white with gray bases. Skull elongate, narrow, with elongate rostrum; zygomatic plate projecting well forward; incisive foramina elongate, pointed in front and rounded behind.

The species, which superficially resembles *Melomys lanosus*, appears to have no close relatives. It may be a mountain-living offshoot of the *leucopus-niobe* groups of *Rattus*. It is much larger than other members of the *niobe* group, as the length of the hind foot (s.u.) is 39 mm. and of the tooth row, 6.3 mm. (For other measurements, see the original description.)

The allocation of this species to the *niobe* group is provisional.

THE *Rattus lutreolus-youngi-sordidus-gestri*
DIVISION

This important division of *Rattus* is sharply distinguished from other indigenous divisions of the genus. Its primary characters comprise its usually open forest habitat (swamps for *lutreolus*); the short tail and foot; the strongly arched, short, broad skull; the tendency for the incisive foramina to be elongate, very narrow, and slit-like; and the tendency towards enlargement of the bulla (except in *youngi* and *lutreolus*). The body form is thickset and the size never very small. The mammary formula is 2-3=10 or 3-3=12, depending upon species. It appears not to vary within any one species.

This is the division that Ellerman (1949, p. 67) named the "*sordidus* group" (*sordidus* being one of the first-described of all the species) and to which Sody's name *Geromys* more or less applies. *Geromys*, by definition, has the mammary formula 2-3=10, yet, owing to error (as explained beyond), *gestri* was made the type of *Geromys*. The division contains four distinct groups, possibly five, if

sordidus should not fall into one of the others. They are:

<i>Rattus youngi</i> group	Little specialized; bullae unenlarged; mammary formula, 2-3=10
<i>Rattus lutreolus</i> group	Specialized for semi-aquatic life; claws large; pelage dense; teeth broadened. Mammae and bullae as in <i>youngi</i>
<i>Rattus tunneyi</i> group	Specialized for arid habitats; bullae much enlarged; mammary formula, 2-3=10
<i>Rattus gestri</i> group	Specialized for grassland habitats; bullae much enlarged; mammary formula, 3-3=12. Contains <i>R. villosissimus</i>
<i>Rattus sordidus</i> and <i>lacus</i> group	Very dark brown species with gray-based under parts. Bullae much enlarged. Number of mammae not determined. This group may later be merged with either the <i>tunneyi</i> group or the <i>gestri</i> group

The relationships of this division, unlike those of the *exulans* division, are unknown. Outside Australia and New Guinea there are no species of *Rattus* to which it can be said to show affinities. Ellerman (1949, p. 67) makes it group "g" of his subgenus *Rattus* (p. 57). Possibly both this division and the rain-forest-inhabiting *assimilis-leucopus* division come of common ancestry farther back in Australian history than is generally supposed. I am more inclined, however, to believe that the ancestors of these two divisions respectively reached Australia and New Guinea directly from separate Asiatic origins.

THE *Rattus youngi* GROUP

As pointed out earlier, this group may well be one of the least specialized of the *Rattus sordidus* division. It includes only *youngi* and *vallesius*, neither of which has the bullae much enlarged, the molars broadened, or the mammae totaling more than 10.

The geographical range in relation to other groups in its division, though rather imperfectly defined, extends from coastal southern Queensland (Moreton Island) inland and

southwest to Liverpool Plains in western and northwestern New South Wales. The group apparently does not extend far southward in central New South Wales, nor do I have records of it much farther north than Brisbane in Queensland. Its present range, of course, may not indicate the region in which it originated.

***Rattus youngi* Thomas**

An unspecialized species and the sole member of its group. Bullae unenlarged. Mammary formula, 2-3=10. Claws not enlarged. Color light dull red brown, with under parts white, a quality of color not unusual in terrestrial rodents found in open-country habitats. Two races have been recognized.

***Rattus youngi youngi* Thomas**

Rattus youngi THOMAS, 1926, Ann. Mag. Nat. Hist., ser. 9, vol. 18, p. 309.

TYPE: B.M. No. 26.7.1.1, adult male, from Moreton Island, off the mouth of the Brisbane River, south Queensland, collected by J. E. Young, April 20, 1924.

MATERIAL: In the Queensland Museum is a probable paratype, No. 4074, the skull of which I photographed.

Color of type reddish brown, the dorsal pelage rather long, with long, black, white-tipped guard hairs. Under parts buffy white, with the hair bases gray. Hands and feet white. Tail scales 11 per centimeter, scale hairs two to two and one-half scale lengths. The bullae are considerably smaller than in either *tunneyi* or *culmorum*.

This animal is rare in collections, and little is known about its range.

***Rattus youngi vallesius* Thomas**

Rattus culmorum vallesius THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 426.

TYPE: B.M. No. 47.8.14.5, adult male, from Duck Creek, Macquarie River [approximately longitude 147° 40' E., latitude 31° 40' S.], central New South Wales, collected by Sir Thomas Mitchell, February 7, 1846.

The present color of this ancient specimen is grayish brown above; buffy white, the hairs gray-based, beneath. Hands and feet dull white. Tail scales 12 per centimeter, the scale hairs about two scale lengths.

No other specimens are known.

Removal of this form from the species *culmorum* to *youngi* is prompted mainly by the smallness of the audital bullae.

THE *Rattus lutreolus* GROUP

The members of this somewhat specialized group appear to be derived directly from a *youngi*-like ancestor. One can picture the slow transition from a dry, open-forest environment to a colder, swamp environment, accompanying increase in size and strength, darkening of body color, increasing density of pelage, lengthening of claws, and increased massiveness of skull and teeth.

The group is confined to the south and southwestern portions of Australia; its northern limit is near Imbil, south of Bundaberg, southern Queensland. A race (*velutinus*) is found in Tasmania. The form *vellerosus* occurs in the Glenelg River area of Victoria. In Western Australia the group is represented by the closely related form *fuscipes* and its insular representative, *mondraïneus*.

I do not think *R. glauerti* belongs here. It has been sometimes referred to by authors as an island representative of *R. lutreolus fuscipes*. It is very different, however, and the skull has the general proportions of that of members of the *Rattus exulans* division, with which I have placed it in this paper.

Troughton (1948) referred the possibly extinct *Rattus sordidus* to this group, but on account of the very large size of its bullae this appears to be incorrect.

***Rattus lutreolus* (Gray)**

The characters of the species are sufficiently shown under the several subspecific descriptions which follow. Troughton (1937) discussed the species and proposed several races. Finlayson (1935) had previously dealt with the species in Victoria. The latter found two color groups which he tentatively connected with differences of altitude above sea level. It seems likely that one of them may equal the race *vellerosus*.

***Rattus lutreolus lutreolus* (Gray)**

Mus lutreola GRAY, in Gray, 1841, Journals of two expeditions . . . in . . . Australia, vol. 2, app., p. 409.

Rattus lutreolus cambricus TROUGHTON, 1937, Australian Zool., vol. 8, p. 283,

Types: The following "cotypes" of *lutreolus* were found at the British Museum: B.M. No. 41.1254, old male, near Adelaide, South Australia; B.M. No. 41.1258, adult male, Mosquito Island, Hunter River, New South Wales; B.M. No. 41.1259, adult female, Macdonald River, New South Wales. Two others are B.M. No. 41.1254 (163e), male, from an island in Bass Strait, and B.M. No. 41.1257, male, from Kangaroo Point, Tasmania (the last is referable to the race *velutinus*). All are from the Gould collection, referred to by Gray (*op. cit.*, p. 297) as "recently purchased." The types of *cambricus*, Sydney, Nos. M.3192-3193, were from Booloombayt, Myall Lakes district, north of Newcastle, New South Wales.

Gray, in his original description, gave as localities: "R. Torrens, Bass's Straits, New South Wales; Musquito Islands and Macdonald's River, Van Diemen's Land, Tasmania's Peninsula." According to the label on B.M. No. 41.1258, Mosquito Island is at or near the Hunter River, New South Wales, and it is this specimen that Thomas chose for his lectotype (Thomas, 1921a). While lectotypes are inadmissible under the Rules and Opinions, no one can doubt the restrictive action exercised then by Thomas. Iredale and Troughton (1934) and Troughton, in the various editions of his book "Furred animals of Australia" (latest, 1948), prefer the River Torrens for the type locality, but by the first-reviser rule Thomas' selection, made a dozen years earlier, should hold, and Hunter River must stand as type locality. This decision probably throws the race *cambricus* Troughton into synonymy.

MATERIAL: Moseley's Ranch at the headwaters of the southern branches of the Clarence River, New South Wales, taken by H. C. Raven, four; southern New South Wales (U.S.N.M.), 10; Guy Fawkes District, New South Wales (C.N.H.M.), one.

Pelage of type (B.M. No. 41.1258) quite long and now grayish brown; beneath buff, with gray hair bases. Tail scales nine per centimeter, scale hairs two and one-half scale lengths. Width of hind foot at fifth metatarsal, 5.6 mm. Skull (the back broken), heavily built, muzzle broad (6.5 mm.); zygomatic plate strongly thrown forward, almost forming a right angle; palatal foramina nar-

row, not extremely long; mesopterygoid fossa narrow; nasals level with premaxillae. Incisors orthodont; molars broad.

***Rattus lutreolus imbil* Troughton**

Rattus lutreolus imbil TROUGHTON, 1937, Australian Zool., vol. 8, p. 283.

TYPE: Sydney, No. M.6228, adult male, from Imbil, Gympie District, south Queensland.

Compared with *cambricus*, Troughton found "rather tawny dorsal coloration and shorter, sparser fur . . . nasalia . . . narrower anteriorly and the bullae shorter . . ."

This race is the most northerly of the forms of *lutreolus*.

***Rattus lutreolus vellerosus* (Gray)**

Mus vellerosus GRAY, 1847, Proc. Zool. Soc. London, p. 5.

COTYPES: B.M. No. 47.3.1.1, skin without skull (not sexed); B.M. No. 47.3.1.2, skin and skull (the back missing), adult male, both from plains between the Murray River and the Glenelg River, South Australia, collected by G. Gray. Thomas (1921a, p. 432) made the second of the two his "lectotype."

Pelage of type long and straight, the guard hairs 30 to 35 mm. Present color light sandy brown, but probably originally darker. Tips of ventral hairs now cream, bases chocolate brown. Tail scales, 11 per centimeter, hairs three to four scale lengths.

Interorbital region of skull No. 47.3.1.2 narrow; width of muzzle, 6.1; nasals not exceeding premaxillae; incisive foramina slit-like; molars wide.

***Rattus lutreolus velutinus* (Thomas)**

Mus velutinus THOMAS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 9, p. 415.

TYPE: B.M. No. 77.7.3.1, young adult female, from Tasmania, collected by A. Simpson.

MATERIAL: Arthur River, Tasmania, collected in 1922 by H. C. Raven, ± 20 ; same locality (U.S.N.M.), obtained by C. M. Hoy, seven; same locality (M.C.Z.), three.

Type with soft, close fur, grayish brown above, buffy beneath, all hairs with gray bases. Tail scales 12 to 13 per centimeter, scale hairs three scale lengths. Muzzle of

skull narrower than in *lutreolus* (5.4 mm.), zygomatic plate more rounded and much narrower; palate narrow; bulla shorter than tooth row, as in *lutreolus*.

A slightly smaller race of *lutreolus*.

***Rattus lutreolus fuscipes* (Waterhouse)**

Mus fuscipes WATERHOUSE, 1839, The zoology of the voyage of H.M.S. "Beagle," vol. 1, Mammalia, p. 66.

TYPE: Not found. Three topotypes, B.M. No. 46.4.4.74, B.M. No. 58.11.24.8, and B.M. No. 58.11.24.11 were examined; also an adult female, B.M. No. 6.8.1.70, from King River, south Western Australia. The skulls of the first three, young adults, lack the bullae.

MATERIAL: Pemberton (M.C.Z.), including one female only but it clearly shows the mammary formula 2-3=10, seven.

The topotypes strongly resemble *R. assimilis* externally but have finer tail scales (13 per centimeter). Tail short, fuscous above and beneath; hands and feet grayish white, ear smaller than in *assimilis*.

Incisive foramina slightly narrower than in *assimilis*, almost slit-like; bulla shorter than tooth row.

The series of good specimens from Pemberton, Western Australia, permits a far more complete study than do the old and broken topotypes at the British Museum. *R. fuscipes* is short-tailed as is *R. lutreolus*. The general character of the unbroadened teeth is with *assimilis*. The bullae, full but not at all enlarged, agree with those of *lutreolus*. The zygomatic plate somewhat resembles that of *assimilis*. The incisive foramina show the slit-like character, slightly broadened in front of those of *lutreolus*. The premaxillo-frontal and naso-frontal sutures, which differ widely in *assimilis* and *lutreolus*, are intermediate in form in *fuscipes*. The rostrum is unlengthened. The mammary formula is 2-3=10.

Troughton (1948) mentions that *fuscipes* is a "water-loving species," behavior that confirms the relationship to *lutreolus* suggested by the anatomy.

***Rattus lutreolus mondraineus* Thomas**

Rattus mondraineus THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 428.

TYPE: B.M. No. 7.7.18.3, adult male, from

Mondrain Island, Recherche group, south coast of Western Australia, collected April 26, 1906, by J. T. Tunney.

MATERIAL: Recherche Archipelago, collected by J. T. Tunney, (topotypes) obtained for the United States Museum by exchange, two.

Type with hair long, the guard hairs very long, brownish gray; under parts dull white, with the hair bases dark gray. Ears large; feet and hands grayish white. Tail scales 12 per centimeter, scale hairs two and one-half to three per scale.

Profile of skull moderately arched; braincase full; zygomatic plate rather narrow; incisive foramina moderate in size; length of bullae nearly equal to length of tooth row; molars rather small.

THE *Rattus tunneyi-culmorum* GROUP

The rats *tunneyi*, *woodwardi*, *melvilleus*, *dispar*, and *culmorum* almost certainly constitute a single species group. The degree of their distinctness from one another alone is in question. All are characterized by possessing extremely large bullae, which are much longer (about as 9:7) than their respective tooth rows, and by the mammary formula, 2-3=10, uniformly exhibited in the females. The skulls are short and broad, strongly arched in profile, and have relatively short rostra. The back of the palate lies level with the middle of m^{3-3} .

This group is related on the one hand to the *youngi* rats of southern Queensland and New South Wales, which have the same mammary formula and similar skull structure but much less inflated bullae, and on the other hand to the *gestri* group of New Guinea and northern Australia in which the bullae are almost as large but the mammary formula is 3-3=12.

KEY TO THE SPECIES OF THE *Rattus tunneyi-culmorum* GROUP

- Under parts white or buffy white to the roots *tunneyi*
- Under parts white with the hair bases gray *culmorum*

***Rattus tunneyi tunneyi* (Thomas)**

Mus tunneyi THOMAS, 1904, Novitates Zool., vol. 11, p. 223.

TYPE: B.M. No. 4.1.3.30, adult female,

from Mary River, east of Darwin, Northern Territory, September 13, 1902, collected by J. T. Tunney.

MATERIAL: One hundred miles south of Darwin, Northern Territory, collected by C. M. Hoy (U.S.N.M.), seven.

The rather soft thin pelage of the type specimen is light yellowish brown, with a touch of fuscous; the under parts are self-colored buffy white; the hands and feet are white. The mammary formula in the United States National Museum material is apparently $2-3=10$. This can be discerned, the third inguinal uncertainly, in only two of the females. The spacing of the mammae is as I have described beyond for *R. t. dispar*. Scales nine per centimeter, scale hairs two to two and one-half scale lengths.

"These rodents burrow in the ground and are difficult to get" (Tunney).

What was apparently this species was recorded under the name "*rufescens*" by Collett (1897) as collected by Dahl.

***Rattus tunneyi woodwardi* (Thomas)**

Mus woodwardi THOMAS, 1908, Ann. Mag. Nat. Hist., ser. 8, vol. 2, p. 374.

TYPE: B.M. No. 5.1.9.1, young adult female, Lagrange Bay, 150 miles west-southwest of Derby, north Western Australia, January, 1899, collected by J. T. Tunney. Also a paratype, B.M. No. 5.1.9.5, adult male, with broken occiput.

Dorsal pelage brown, with few darker hairs; under surface buffy white; hands and feet white. Tail scales 11 per centimeter, scale hairs one to one and one-half scale lengths. Mammae, $2-3=10$.

The paratype (above) has large, full bullae like those of *tunneyi*.

A male and female in the Rothschild Museum at Tring, England, from Lewis Island, Dampier Archipelago, Western Australia, are provisionally referred here. The length of the bulla in the male is 8.4 mm., of m^1-3 , 6.3 mm., molars smaller than in *tunneyi*. The large bullae come close together. The palate is narrow.

Ellerman (1949, p. 47) considers this "a very distinct and perhaps specific form"; yet when I studied the type I concluded that it stood close to *tunneyi*.

***Rattus tunneyi melvilleus* Thomas**

Rattus melvilleus THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 427.

TYPE: B.M. No. 13.6.28.33, adult male, from Biro, Apsley Strait, Melville Island, Northern Territory, collected by J. P. Rogers, November 27, 1911. Also two paratypes. I have seen no others.

Dorsal color of pelage of the type light brown, with some darker hairs; under parts buff, self-colored; hands and feet white. Scale hairs 10 per centimeter, scale hairs two scale lengths.

This form appears to be an exceptionally large race of the mainland *tunneyi*. The length of the bulla is more than 10 mm. The teeth, however, are not larger, so that the type specimen may be one of those few individuals that have survived a season longer than most, meanwhile growing somewhat larger.

***Rattus tunneyi dispar* Brazenor**

Rattus tunneyi dispar BRAZENOR, 1936, Mem. Natl. Mus. Melbourne, vol. 9, p. 5.

TYPE: Melbourne, No. R.12642, young male with nearly unworn teeth, from Alice Springs, central Australia. This specimen, from the Horn expedition, had been identified earlier by Waite as *R. greyi*.

Color reddish above; under parts yellowish buff; hands and feet yellowish white; scale hairs about two and one-half scale lengths. Bullae very large; in relation to the tooth row, about 9:7.

We have a female topotype in alcohol, A.M.N.H. No. 107404, collected by W. B. Spencer in 1916. The mammary formula is $2-3=10$. As in *R. greyi peccatus* one pair of anterior mammae is placed on the chest between the arms. The other is about 1 mm. behind the axillae. The pairs of inguinal mammae are spaced nearly as in *peccatus*, their distances apart, first to second, 15 mm., second to third, 7 mm.

***Rattus culmorum* (Thomas and Dollman)**

Mus culmorum THOMAS AND DOLLMAN, 1908, Proc. Zool. Soc. London, p. 790.

TYPE: B.M. No. 7.9.15.21, young adult female, from Beach Mountain, Inkerman,

between Ayr and Bowen, north Queensland, May 6, 1901, collected by W. Stalker.

Dorsal pelage of type thin and rather bristly, grayish brown; under pelage buffy white, with gray bases (thus differing from *tunneyi* and allies); hand and feet white. Tail scales 10 per centimeter, scale hairs one and one-fourth to one and one-half scale lengths. Mammary formula, 2-3=10.

The bullae are large as in *tunneyi*, but not quite so large as in *R. g. conatus*.

These rats were collected in numbers by McDougall (1944, 1946) in the sugar-cane areas of Queensland.

The northern race *apex* which was described under the species *culmorum* is here referred to *gestri*, with which there is agreement in the mammary formula (3-3=12). The southern *R. c. vallesius* is referred to *youngi* and *R. c. austrinus* to *greyi*.

Finlayson's (1940, p. 246) description of a male specimen from Duaringa, west of Rockhampton, though very full, did not state whether the ventral pelage has gray bases or not. He pointed out the relationship to *tunneyi* and suggested synonymy with *dispar* Brazenor. His illustration of the skull is very clear and indicates a member of the *tunneyi-culmorum* group. It is unfortunate that he collected no female specimen. Duaringa is 300 miles south of the type locality.

[THE *Rattus sordidus* GROUP]

Owing to ignorance of the number of mammae in this species, I have not been able to refer it surely to any one of the several groups that follow. The very large size of the bullae points towards the *tunneyi* and *gestri* groups and away from *youngi* and *lutreolus*. The gray bases of the ventral pelage indicate *gestri* rather than *tunneyi*, although *culmorum* also has gray-based ventral fur. The general color scheme of *sordidus* when alive and fresh must have somewhat approached that of *lacus* (next described), but its bullae are much larger. For this reason it seems best to hold *sordidus* in a group to itself. The original Darling Downs have been largely plowed up and planted to wheat and sorghum, but there is still a possibility, despite the abundance of foxes there, that *R. sordidus* may yet be found in some remote corner.

The association here of *lacus* with *sordidus* is provisional.

Rattus sordidus (Gould)

Mus sordidus GOULD, 1858, Proc. Zool. Soc. London, for 1857, p. 241; 1858, The mammals of Australia, pt. 10 (vol. 3), pl. 17 and text.

COTYPES: B.M. Nos. 58.11.24.5, 58.11.24.6, adults, sex undetermined, from "open plains," Darling Downs.

Skulls of the cotypes (broken at the back) well arched in profile, the interorbital region narrow, the nasals not surpassing the premaxillae forward, the bullae very large, palatal foramina long and slit-like, molars broad. The skins are now dark brownish gray, ventrally grayish buff, with fuscous bases; hands and feet gray; tail fuscous, slightly lighter beneath. Tail scales 11 per centimeter, scale hairs about three scale lengths.

Ellerman (1949, pp. 47-48) referred especially to the very large size of the bullae in this seemingly extinct species. The mammary formula is unknown. Troughton (1947) believed that *sordidus* was a representative of *lutreolus*, the swamp rat, but the Darling Downs offer scarcely any environment suitable to this species, and the disparity in the bullae makes conspecificity improbable. I suggest very tentatively that *sordidus* may have been the extreme southern representative of my new *R. lacus* from the Atherton Tableland, in which, however, the mammary count is also unascertained.

Rattus lacus, new species

TYPE: A.M.N.H. No. 107312, adult male, Lake Barrine, among "blade grass," Atherton Tableland, northern Queensland, 2400 feet, collected by Gabriele Neuhäuser, October 21, 1937.

GENERAL DESCRIPTION: An unusually dark-colored member of the *gestri* division of *Rattus*, with the hair bases fuscous and the tips bronzy above and below, hands and feet blackish; skull with the rostrum, incisive foramina, and palate typical of the division, but the teeth larger and the bullae a little smaller than normal.

DESCRIPTION OF TYPE: Dorsal pelage long (about 18 mm.), not coarse, spineless, but with scattered, very long (35 mm.),

black over-hairs. The tips of the dorsal pelage bronzy brown. Under parts dark brownish gray, the tips of the hairs pale brown, the general effect dark, not whitish or brownish. Tail black, slightly shortened by accident. Hands and feet blackish, the hairs tipped by yellowish. Ears fuscous, with minute brownish hairs. Skull profile well arched; rostrum short; incisive foramina elongate, slit-like, widest near the front. Bullae full but small, considerably smaller than in any of the races of *gestri*. Zygomatic plate broad. Molar rows convergent anteriorly.

MEASUREMENTS OF TYPE: Skin (field measurements): head and body, 158 mm.; tail, 99 (truncated slightly); hind foot (s.u.), 29; ear (apparently from notch), 20. Skull: greatest length, 36.5 mm.; condylobasal length, 36.0; greatest zygomatic width, 19.8; least interorbital width, 5.1; breadth of braincase, 15.7; interparietal, 9.6; nasals, 13.5 by 4.5; zygomatic plate, 4.6; palatal length, 20.2; incisive foramina, 17.2 by 1.7 (greatest); width of mesopterygoid fossa, 2.3; length of bulla, 6.5; length of m^{1-3} , 7.2; m^1 , 3.9 by 2.5; m^2 , 2.4 by 2.4; m^3 , 1.7 by 1.7.

The type is accompanied by four paratypes (one with mismatched skull), two males and two females. Unfortunately, I have been unable to determine the mammary formula for either female, though it should be either 2-3 (*tunneyi-youngi*) or 3-3 (*gestri-conatus*). The very dark coloring, which reminds one of the species *lutreolus* of southeastern Australia, is unusual for the group. On the other hand the bladey-grass habitat is customary; some of our *conatus* from the Cooktown area were trapped in similar locations. From two of the paratypes the bullae are missing. In the other they measure 6.4 mm. The molar series is 7.3 and 7.5 mm. (one not measurable). The skulls are separated from those of *sordidus* of Darling Downs by their smaller bullae.

THE *Rattus gestri-villosissimus* GROUP

This is the most widely distributed group in the *lutreolus-gestri-sordidus-youngi* division. *Rattus gestri* is centered around the Torres Strait region, where for the most part it inhabits the strongly illuminated open

forests so prevalent in that area. In New Guinea it occurs in the savanna lands about Port Moresby and Rigo (typical race) and in the southern grasslands of the Western Division of Papua (race *aramia*). In Australia it is found in the Cape York Peninsula, Arnhemland, and, as *villosissimus*, southward through Western Queensland to New South Wales. It is apparently a strongly cyclic type of rat, its numbers waxing and waning with favorable or unfavorable seasons. In south New Guinea in 1936-1937 the race *aramia* was very common; in Cape York in 1948 the race *apex* was comparatively scarce, and that year in Arnhemland the local race *colletti* was not taken at all. The year 1948 was the culminating year of a protracted drought. The form *conatus*, which occurs at the base of the Cape York Peninsula, where somewhat more rain falls, was not quite so scarce as *apex* was. I can distinguish only two species, *villosissimus* and *gestri*.

As already pointed out, the *gestri* group is distinguished by the mammary formula 3-3=12. Both of its species have the bases of the ventral pelage gray (compare the *tunneyi* group). The bullae are distinctly enlarged but do not quite attain the great size to be seen in the *tunneyi* group. The strongly arched profile of the skull, the slit-like incisive foramina, short skull and rostrum, and short tail and foot indicate *gestri*. The same characters occur in *villosissimus*, but in that species the tail is longer and the skull somewhat less shortened and arched. The distribution of *villosissimus* is internal to Australia; it occurs from the Gulf of Carpentaria south to northwestern New South Wales and parts of South Australia. The large size of the teeth in coastal "*conatus*" from south of Cairns suggests relationship with *villosissimus*, perhaps through the arid gap at the Burdekin River valley.

Sody (1941) separated *gestri* generically from other members of the genus *Rattus* by proposing the name *Geromys* to contain it. At best *Geromys* should remain a subgenus. If *Geromys* were used, I would place all the members of the present *gestri* group, as here defined, in *Geromys*, though it is still open to question whether *Geromys*, if accepted, should

be extended to cover *tunneyi*, *youngi*, and *lutreolus*, or not.

In specimens of *R. gestri apex*, found from the tip of the Cape York Peninsula (Lockerie, and Albany Island) to Iron Range, the length of the bulla in adults varies from 108 to 124 per cent of the length of the molar crowns. In a single specimen from Brown's Creek, a tributary of the Pascoe River, the bulla attains the extreme of 130 per cent. In *R. g. conatus* from Musgrave Telegraph Station, Seagren's Farm, Helenvale, and Ship-ton's Flat (the last three places near Cooktown) the percentage runs in adults from 108 to 117. This is but little different from that of *apex*. Russell River specimens (south of Cairns) show about 100 per cent for that ratio. The dark-colored series *lacus* from Lake Barrine, described above, gives 89 per cent only.

It will be observed that *apex* from the extreme tip of the Peninsula and *conatus* from the Cooktown area are linked together by a chain of geographical intermediates. The differences that separate the two are so slight as to be nearly negligible, for differences in the parts of the skulls are largely dependent upon age and sex. Nor are there important differences in color. However, it does appear that the length of the molar tooth row in typical *apex* averages somewhat, though not consistently, less than in *conatus* from the south. According to McDougall (1944, 1946) *conatus* extends southeast of Cairns through the coastal sugar-cane area.

The small series of the new form *lacus* from Lake Barrine, which I have placed after *sordidus* provisionally, differs sharply from the *apex-conatus* rats. Even though only two of the skulls are measurable, the bulla is seen to be markedly shorter than the molar series, only 87 to 89 per cent. This is not due to youth, for in *apex* the bulla of the young rat varies from 108 to 111 per cent of the molar tooth row.

Not only are *apex* and *conatus* very closely related to each other, but both are almost equally close to the form from the south New Guinea grasslands, *aramia*, while *aramia* in its turn is barely distinguishable from *gestri* from the Port Moresby savanna area. The Australian branch of the group, *colletti*,

which occurs in the Northern Territory, is also weakly differentiated. All these rats have the mammary formula, $3-3=12$, in contradistinction to *tunneyi* and *culmorum*, in which the formula is $2-3=10$. The species *villosissimus* seems to take over geographically where *gestri* leaves off, from the Gulf of Carpentaria southward to New South Wales.

Rattus gestri (Thomas)

Rattus gestri gestri (Thomas)

Mus gestri THOMAS, 1897, Ann. Mus. Civ. Genova, ser. 2, vol. 18, p. 611.

Rattus brachyrhinus TATE AND ARCHBOLD, 1935, Amer. Mus. Novitates, no. 802, p. 4.

TYPES: I have seen the type series of *gestri* mentioned by Thomas (*tom. cit.*, p. 607), comprising one in London, B.M. No. 97.8.7.36, adult female, and several in Genoa. In addition there are at Genoa a number of paratypes. All are from Kapa Kapa, a few miles southeast of Port Moresby, and all were collected by L. Loria. The type of *brachyrhinus* is A.M.N.H. No. 104210, a male, from Baroka, Angabunga River, collected by R. Archbold.

Unfortunately the series of paratypes of *gestri* proves to be composite and to contain two species. It includes a male, Genoa, No. C.E.3501/48 with cleaned skull, identical to the British Museum female specimen. Both fit Thomas' description of *gestri* excellently. Both have the short ears of our *brachyrhinus* (which equals *gestri*). An adult female in Genoa, with the skull poorly cleaned and the mammary formula $2-3=10$, has much longer ears and proves to be a different species. This animal probably furnished the false evidence which caused Thomas' mistake in stating the mammary formula of *gestri* to be $2-3=10$. We have numerous specimens of our synonymous *R. brachyrhinus* which demonstrate that its mammary formula is $3-3=12$. Some of the rest of the paratypic series are young animals with the longer ears of the female mentioned above.

It is this composite situation, coupled with Thomas' statement regarding the mammary count, which has misled authors for so long. The synonymy of *brachyrhinus* with

gestri was suspected by Troughton (1937), even though he did not account for the seeming disparity of the mammary formulae or know that Thomas had actually had two species before him when describing *gestri*.

The fact that Thomas, in dividing the co-types, took back to London with him a female of true *gestri* (with formula 3-3), even though he published the Genoa count of 2-3, is to my mind conclusive that he thought of *gestri* as the short-snouted species with large bullae. Consequently I here restrict the name to indicate only such rats, our name *brachyrhinus* then falling as a synonym.

MATERIAL: Kokebagu, Rigo, near Kapa Kapa, one; Port Moresby, four; Rona, Astrolabe Range, eight; Baroka, Mekeo District, northwest of Port Moresby, 10 (series of topotypes of *brachyrhinus*).

[*Rattus gestri aramia* Troughton]

Rattus gestri aramia TROUGHTON, 1937, Rec. Australian Mus., vol. 20, p. 119.

TYPE: Sydney, No. M.4893, from near the mouth of the Aramia River, a few miles north of the estuary of the Fly River. I did not study this specimen while in Sydney in 1947, as we already had a large series of it from south New Guinea, collected by the Archbold expeditions in 1936-1937.

MATERIAL: Daru Island, off mouth of Fly River, 30; Gaima, north bank, near mouth of Fly River, seven; Old Mawatta, Oriomo mainland, opposite Daru Island, three; Wuroi, Oriomo River, 20; Dogwa, Oriomo River, one; Lake Daviumbu, Fly River, near mouth of Strickland River, 71; Mabaduan, south coast, opposite Cape York, six; Bugi, mouth of Wassi Kussa River, 11; Tarara, upper Wassi Kussa River, 14. Total, 163.

Troughton (*loc. cit.*) believed that this south New Guinea race differed from *gestri* of the Port Moresby area by its smaller size, differing zygomatic plate, wider interorbital region, heavier molars, and larger bullae, as well as other characters. Later, however (1946, under *bunae*), after he had reached the conclusion that *gestri* and *brachyrhinus* were distinct species (they really are synonymous), he concluded that *aramia* should be shown as a race of *brachyrhinus*. Actually, *aramia* is an extremely weak race of *gestri*.

Rattus gestri apex Troughton

Rattus culmorum apex TROUGHTON, 1939, Rec. Australian Mus., vol. 20, p. 280.

TYPE: Sydney, No. M.3371, old female, from Skull Creek, extreme northwest of Cape York Peninsula.

MATERIAL: Albany Island, three; Lockerbie, a few miles southwest of the extreme tip of Cape York, eight; Iron Range, eight; Mt. Tozer Camp, 400 feet, three; Brown's Creek, Pascoe River, one; upper Peach River (Camp Oven Pocket, 1200 feet), two; Musgrave Telegraph Station, two.

All females of the American Museum of Natural History series have the mammary formula 3-3=12. Furthermore, this race is virtually indistinguishable from the south New Guinea race of *gestri* which Troughton named *aramia*. I do not think they should be associated with *culmorum*, which has but 10 nipples in the females. *Apex* appears to be annectant between the Papuan *aramia* and the Australian *conatus* (which also has 12 nipples in females).

Rattus gestri conatus Thomas

Rattus conatus THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 12, p. 159.

TYPE: B.M. No. 23.1.5.15, adult female, collected at the Annan River, Cooktown, by T. V. Sherrin.

MATERIAL: Seagren's Farm, Kilometer 10, Cooktown-Laura Railway, six; Helenvale, 20 miles south of Cooktown, three; Shipton's Flat, 30 miles south of Cooktown, two; Cairns (C.N.H.M.), two; Russell River, two.

The type is colored yellowish gray, much as in *colletti*. The under parts are creamy white, with the bases of the hairs gray. Hands and feet buff. Tail scales nine per centimeter, the scale hairs two to three scale lengths. The mammary formula is 3-3=12.

Rattus gestri colletti (Thomas)

Mus colletti THOMAS, 1904, Novitates Zool., vol. 11, p. 599.

TYPE: B.M. No. 4.4.4.4, adult female, from South Alligator River, east of Darwin, Northern Territory, collected by J. T. Tunney.

The dorsal color of the type is dark yel-

lowish gray, made up of hairs having fuscous bases and yellow buff tips and guard hairs which are flat spines. Under parts buff, with gray hair bases. Hands and feet buff. Tail scales 11 per centimeter, scale hairs two to three scale lengths.

As in other races of *gestri*, the mammary formula of the present form is 3-3=12.

Rattus bunae Troughton

Rattus gestri bunae TROUGHTON, 1946, Rec. Australian Mus., vol. 21, p. 408.

TYPES: Sydney, No. M.7072, adult male, and No. M.6989, adult female (allotype), from Dobodura District, Northern Division, Papua.

This anomalous form was described as much darker than *gestri*, "dorsal color less buffy and of a more fuscous to blackish-brown tone . . . entire belly more whitish, about pale smoky-gray, instead of the yellowish cream-buff of the topotypical *gestri*." Troughton went on to show that the zygomatic plate was more prominent above, the incisive foramina were shorter, and the molar tooth row was smaller than in true *gestri*. The lengths of the nasals in *bunae* are given as 14.0 and 14.1 mm. In true *gestri* they are shorter: 13.5 and 13.3. The zygomatic widths: in *bunae*, 19.9 and 19.8; in *gestri*, 19.2 and 17.7. However, it is not certain just what Troughton meant then by "*gestri*."

In view of the above and of the mammary formula, 2-3=10, it is open to question whether *bunae* should be referred to the species *gestri* at all or not. The small size of the bullae and the unusual distribution pattern (in rain forest north of the mountains) support this doubt. On the other hand its mammary formula precludes any reference to the *leucopus-mordax* or *ruber-praetor* groups; it agrees with neither. We now have a similarly dark species, *lacus* from Lake Barrine, once rain forest country, but now secondarily cleared. *Rattus bunae* may be analogous to *lacus*. There is still the possibility that *bunae* may be a member of the *Rattus rattus* division. Ship rats have become established at many places along the coasts of New Guinea. The mammary formula and length of tail in relation to length of head and body should be checked.

Rattus villosissimus Waite

This species of the *R. gestri* group is readily distinguished by its very long, though coarse and thin, pelage, mixed with numerous long guard hairs. The general coloring is gray (a mixture of black and gray-white hairs). The mammary formula is 3-3=12. The bullae, though large, are generally a little smaller than those of *tunneyi* and *culmorum*. Most examples are considerably larger rats than *gestri*.

The species inhabits western Queensland, northwestern New South Wales, and adjoining parts of the Northern Territory and South Australia. In general it occurs within the 10-inch to 25-inch zone of rainfall in those areas. There are two races, the typical race and the geographically more restricted southern race *profusus*.

An excellent and detailed discussion of the species has been published by Finlayson (1939a, p. 88).

Rattus villosissimus villosissimus (Waite)

Mus longipilis GOULD, 1854, The mammals of Australia, pt. 6 (vol. 3), pl. 13 and text (preoccupied name).

Mus villosissimus WAITE, 1898, Proc. Roy. Soc. Victoria, vol. 10, pt. 2, p. 125 (new name for *longipilis*).

TYPE: Waite wrote that the type was preserved in the Australian Museum.

Thomas was for long confused over the type locality of this species. He wrote (1906, p. 537): "The type locality of Gould's *M. longipilis* was the Victoria River, about 400 miles to the west of Alexandria, but in the same faunal area [as Alexandria]." But 15 years later we find him remarking (1921c, p. 620): "... the Victoria River was the same as the Barcoo or Cooper's Creek, which runs into Lake Eyre, Central Australia." The latter appears to be correct.

MATERIAL: Dickaree, in Birdsville area, southwestern Queensland (A.M.N.H.), three (11 more in alcohol); Alroy, Northern Territory (B.M.), one; Diamantina (M.C.Z.), one; there is a short series from Boulia in the Queensland Museum, one skull of which (No. 6721, male) I photographed.

Rattus villosissimus is distinguished from the usually smaller *tunneyi* group by the general lack of reddish brown in the color of

the pelage. The long hair is gray brown, with a mere trace of tan and a mixture of whitish tipped body hairs and blackish, very long guard hairs (up to 80 mm.). The under parts are white, but have concealed gray bases. There may be a patch of pure white hairs beneath the neck. The length of the hind foot in three fully grown males is 34 mm., 33, 33, which is in general accordance with an old male of *R. gestri apex* from the tip of Cape York Peninsula. The length of the tail in our alcoholic series varies from 130 mm. to 160. Waite reported the number of mammae as 2-3=10, but there are numerous alcoholic specimens in the American Museum of Natural History and at Melbourne with the mammary formula 3-3=12. This is no doubt the correct formula.

It is generally accepted that *villosissimus* is the "plague rat" of the interior of Australia, increasing after the rare "good" rainy seasons to enormous numbers. Such plagues of rats appear in the country over great areas. It is currently believed by local people that they

migrate in definite directions. I could obtain only conflicting data on their alleged movements. There is no doubt that at times they become a real plague, while at the end of a dry cycle (as in 1948 in northwest Queensland) they can scarcely be found.

[*Rattus villosissimus profusus* Thomas]

Rattus villosissimus profusus THOMAS, 1921, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 620.

TYPE: B.M. No. 41.1262, adult male, from Liverpool Plains, longitude 150° E., latitude 31° 10' S., New South Wales, from the Gould collection. There is a paratype, B.M. No. 41.1261.

These very old specimens have gray-brown dorsal pelage, with long guard hairs of 45 mm. The under parts are buff, with the hair bases gray. Hands and feet white. Tail with scales 11 per centimeter, the scale hairs about three scale lengths.

I feel that they differ little or not at all from true *villosissimus* of farther north.

TABLE 5
COMPARATIVE MEASUREMENTS

HYDROMYINAE (except <i>Hydromys chrysogaster</i>)	<i>Leptomys elegans</i> , type Genoa (no number), ad. ♀	<i>Leptomys ernstmayri</i> , type Berlin No. 42400, ad. ♂	<i>Leptomys signatus</i> , type A.M.N.H. No. 105792, ad. ♀	<i>Paraleptomys wilhelmina</i> , type A.M.N.H. No. 150512, ad. ♂	<i>Paraleptomys rufilatus</i> , type C.N.H.M. No. 54236, ad. ♂	<i>Pseudohydromys murinus</i> , type M.C.Z. No. 29904, ad. ♂
Head and body	162	133	144	126	129	91
Tail	154	151	151	135	131	95
Hind foot (s.u.)	40	38	38	31	32	18
Hind foot (c.u.)	—	—	—	—	35	—
Ear	20	—	19	17	—	4(?)
Skull: total length	39.7	36.4	38.4	32.3	35.0	23.5
Condylbasal length	—	—	—	30.3	32.0	—
Condyllo-incisive length	—	—	—	29.2	31.2	—
Condylbasilar length	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—
Basal length	36.1	31.0	32.0	27.2	29.0	21.0
Basilar length	—	—	—	—	—	—
Zygomatic breadth	18.5	15.4	16.2	16.0	16.6	10.3
Interorbital breadth	6.2	6.2	6.2	5.7	6.3	4.8
Interparietal	8.9	7.7	9.7	7.3	9.3	7.0
Breadth braincase	14.9	14.6	14.7	13.5	14.2	10.5
Mastoid breadth	14.9	13.7	13.5	12.2	13.0	9.2
Nasals, length	14.3	12.1	13.3	12.0	13.2	8.0
Nasals, greatest breadth	5.0	4.5	4.7	3.3	3.9	2.9
Zygomatic plate	2.3	2.0	2.1	1.7	2.0	1.2
Diastema	10.6	8.8	10.1	7.7	8.2	6.0
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—
Palatal length	21.1	17.5	20.0	14.5	16.1	10.8
Incisive foramina, length	5.6	5.0	4.8	4.8	4.5	1.9
Incisive foramina, width	3.1	2.7	2.4	2.3	2.5	1.5
Breadth meso-pt. fossa	2.7	2.7	3.1	2.1	2.7	2.0
Width inside m ¹ -m ¹	3.8	3.2	3.3	2.9	3.4	2.7
Length bulla	5.2	4.2	4.8	4.9	4.5	3.4
Crowns m ¹⁻³	6.1	5.5	6.3	—	—	—
Alveoli m ¹⁻³	—	—	—	—	—	—
Crowns m ¹⁻²	5.2	4.6	5.5	4.5	4.8	2.9
m ¹ , length	3.1	2.8	3.5	3.0	3.0	2.2
m ¹ , breadth	1.7	1.6	1.7	1.8	1.8	1.0
m ² , length	1.8	1.7	2.0	1.6	1.7	1.0
m ² , breadth	1.6	1.4	1.6	1.5	1.6	0.9
m ³ , length	0.9	0.6	0.8	—	—	—
m ³ , breadth	0.9	0.8	1.0	—	—	—

HYDROMYINAE (except <i>Hydromys chrysogaster</i>)	<i>Pseudohydromys occidentalis</i> A.M.N.H. No. 110344, ad. ♂	<i>Pseudohydromys occidentalis</i> , type A.M.N.H. No. 150772, ad. ♂	<i>Pseudohydromys occidentalis</i> A.M.N.H. No. 110326, ad. ♂	<i>Pseudohydromys occidentalis</i> A.M.N.H. No. 110391, ad. ♀	<i>Microhydromys richardsoni</i> , type A.M.N.H. No. 152079, ad. ♂	<i>Xeromys myoides</i> , type B.M. No. 87.10.31.2, young ad. ♀
Head and body	115	101	105	102	80	100
Tail	90	90	91	95	92	90
Hind foot (s.u.)	21	20	19	21	20	23.5
Hind foot (c.u.)	—	—	—	—	—	25
Ear	11	8	10	9	8	10
Skull: total length	—	24.5	25.8	—	—	29.2
Condylbasal length	—	—	—	—	—	—
Condyllo-incisive length	—	24.6	25.7	—	—	28.4
Condylbasilar length	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—
Basal length	—	23.5	23.5	—	—	26.2
Basilar length	—	—	—	—	—	—
Zygomatic breadth	—	11.8	12.5	11.7	9.2	14.6
Interorbital breadth	5.3	5.7	5.6	5.3	4.4	5.0
Interparietal	—	5.6	—	—	—	9.3
Breadth braincase	—	10.9	11.0	11.0	—	11.8
Mastoid breadth	—	10.5	10.0	—	9.4	—
Nasals, length	8.1	7.7	8.0	8.3	6.4	8.9
Nasals, greatest breadth	2.6	2.5	2.6	2.6	2.6	3.0
Zygomatic plate	1.6	1.4	1.6	1.4	1.1	2.6
Diastema	8.3	7.7	7.8	7.8	5.0	—
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	12.0	11.1	12.1	11.7	—	—
Palatal length	13.8	12.9	14.0	13.6	10.0	15.7
Incisive foramina, length	2.3	2.2	2.4	2.0	2.5	3.7
Incisive foramina, width	1.6	1.6	1.7	1.5	1.5	2.0
Breadth meso-pt. fossa	1.6	2.0	1.9	1.6	—	1.8
Width inside m ¹ -m ¹	2.8	2.8	2.9	2.6	2.4	—
Length bulla	3.9	3.8	3.8	3.7	3.8	4.7
Crowns m ¹⁻³	—	—	—	—	—	—
Alveoli m ¹⁻³	—	—	—	—	—	—
Crowns m ¹⁻²	2.8	2.7	2.8	2.7	2.4	4.2
m ¹ , length	1.9	1.9	1.9	1.8	1.6	2.9
m ¹ , breadth	1.1	1.1	1.1	1.1	0.8	1.4
m ² , length	1.0	1.1	1.1	1.0	0.8	1.3
m ² , breadth	1.0	1.0	1.0	1.0	0.7	1.2
m ³ , length	—	—	—	—	—	—
m ³ , breadth	—	—	—	—	—	—

HYDROMYINAE (except <i>Hydromys chrysogaster</i>)						
	<i>Xeromys myoides</i> Sydney, No. M.6868, ad. ♂	<i>Baiyankamys shawmayeri</i> , type B.M. field no. 713, ad. ♂	<i>Parahydromys asper</i> , type B.M. No. 99.4.4.1, ad. ♂	<i>Hydromys habbema</i> , type A.M.N.H. No. 110055, ad. ♂	<i>Hydromys neobritannicus</i> , type A.M.N.H. No. 99867, ad. ♀	<i>Crossomys moncktoni</i> , type B.M. No. 7.5.22.3, ad. ♀
Head and body	120	146	220	147	288	200
Tail	95	176	275	170	289	220
Hind foot (s.u.)	25	36.5	55	36	60	50
Hind foot (c.u.)	26.5	—	—	—	—	—
Ear	10	13	10.5	9	—	1
Skull: total length	30.7	—	—	34.1	—	40.6
Condylbasal length	30.6	32.8	—	34.0	54.7	38.5
Condyllo-incisive length	30.7	—	46.5	33.3	—	36.9
Condylbasilar length	—	—	44.1	30.8	—	35.0
Occipitonasal length	—	±32.5	—	33.2	52.2	38.3
Basal length	29.4	—	—	30.5	—	35.1
Basilar length	—	—	—	27.5	—	31.4
Zygomatic breadth	15.8	—	26.0	17.4	28.4	22.0
Interorbital breadth	5.1	5.2	8.7	5.6	6.7	6.0
Interparietal	9.0	—	9.0	9.5	9.7	9.1
Breadth braincase	12.7	14.7	22.0	15.6	—	20.0
Mastoid breadth	12.0	—	21.8	14.3	—	19.0
Nasals, length	9.2	±10.5	16.0	11.2	17.7	11.1
Nasals, greatest breadth	3.2	—	5.5	3.2	5.5	4.6
Zygomatic plate	2.6	1.6	2.6	1.7	3.5	2.0
Diastema	10.0	8.4	12.5	8.0	14.6	10.3
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	—	—	23.2	14.7	26.1	17.2
Palatal length	17.2	—	—	17.8	—	20.5
Incisive foramina, length	5.0	3.0	4.0	4.2	6.0	5.0
Incisive foramina, width	2.3	2.2	2.6	2.1	3.7	2.5
Breadth meso-pt. fossa	2.1	—	4.4	2.2	—	3.7
Width inside m ¹ -m ¹	2.9	—	4.1	4.0	—	4.9
Length bulla	4.9	4.0	6.2	4.0	6.0	4.5
Crowns m ¹⁻³	—	—	—	—	—	—
Alveoli m ¹⁻³	—	—	—	—	—	—
Crowns m ¹⁻²	4.1	4.7	9.5	5.2	9.4	5.6
m ¹ , length	2.7	—	6.8	3.8	6.7	4.0
m ¹ , breadth	—	1.7	3.4	1.8	3.6	2.2
m ² , length	1.5	—	2.9	1.5	—	1.4
m ² , breadth	—	—	2.8	1.3	—	1.6
m ³ , length	—	—	—	—	—	—
m ³ , breadth	—	—	—	—	—	—

MURINAE (pp. 240-243)
Pseudomys (*Pseudomys*)

	<i>Pseudomys australis</i> , type B.M. No. 232a, ad.	<i>Pseudomys murinus</i> , type B.M. No. 53.10.22.4, ad.	<i>Pseudomys minnie</i> , type Sydney, No. M.5195, young ♂	<i>Pseudomys minnie</i> , allotype ♀	<i>Pseudomys minnie</i> A.M.N.H. No. 107395, ad. ♂	<i>Pseudomys flavescens</i> , type Sydney, No. M.6004, ♂	<i>Pseudomys flavescens</i> , allotype ♀
Head and body	125	115	—	117	—	120	133
Tail	90	100	—	111	—	103	115
Hind foot (s.u.)	28	27	28	27	—	30	29
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	—	17	—	23	—	23	17
Skull: total length	—	—	—	30.7	30.6	30.7	32.0
Condylbasal length	—	—	—	—	—	—	—
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	16.0	—	—	16.3	16.0	16.2	16.6
Interorbital breadth	4.5	3.8	—	4.0	4.2	3.8	4.0
Interparietal	9.0	9.1	—	—	8.8	—	—
Breadth braincase	—	—	—	14.3	13.2	14.2	—
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	11.0	12.8	—	11.1	11.0	11.3	12.7
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	3.2	3.5	—	—	3.0	—	—
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	16.7	17.4	—	—	16.7	16.6	17.4
Incisive foramina, length	7.7	7.9	—	7.3	±7	±7.5	—
Incisive foramina, width	—	—	—	—	—	—	—
Breadth meso-pter. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.6	3.0	—	—	2.4	—	—
Length bulla	—	—	—	—	5.7	5.3	5.6
Crowns m ¹⁻³	5.8	5.6	—	5.8	5.7	5.7	5.8
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	3.0	3.0	—	—	3.0	—	—
m ¹ , breadth	1.9	1.8	—	—	2.0	1.9	2.0
m ² , length	1.6	1.5	—	—	1.8	—	—
m ² , breadth	1.7	1.8	—	—	1.9	—	—
m ³ , length	1.2	1.2	—	—	1.2	—	—
m ³ , breadth	1.4	1.3	—	—	1.3	—	—

<i>Pseudomys</i> (<i>Pseudomys</i>)	<i>Pseudomys lineolatus</i> , cotype B.M. No. 57.10.26.1	<i>Pseudomys lineolatus</i> , cotype B.M. No. 57.10.24.4, ad. ♂	<i>Pseudomys oralsis</i> , type B.M. No. 47.1.20.2, young ad.	<i>Pseudomys shortridgei</i> , type B.M. No. 6.8.1.73, ad. ♂	<i>Pseudomys rawlinnae</i> , type Sydney, No. M.4642, ad. ♂	<i>Pseudomys auritus</i> , type B.M. No. 53.10.22.6, ad.	<i>Pseudomys higginsii</i> A.M.N.H. 66002, ad. ♂
Head and body	130	120	160	140	113	125	125
Tail	100	120	135	105	99	—	178
Hind foot (s.u.)	29	31	31	28	27.5	31.5	34.5
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	16	15.5	16	14	21	22	±15
Skull: total length	—	34.3	34.0	±33	30.8	—	35
Condylobasal length	—	—	—	—	—	—	—
Condyllo-incisive length	—	—	—	—	—	—	—
Condylobasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	—	17.6	17.5	16.6	16.1	—	17.4
Interorbital breadth	4.2	4.4	3.8	4.3	3.8	4.5	4.9
Interparietal	—	8.2	8.9	9.8	—	—	10.5
Breadth braincase	—	15.5	15.2	14.1	13.7	—	15.0
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	13.0	14.0	13.4	11.4	12	13.8	12.5
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	3.5	3.7	3.5	3.4	—	3.7	3.0
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	18.3	19.4	18.5	16.9	—	19.2	18.0
Incisive foramina, length	±8.7	8.8	±7.5	±6.5	7.0	8.7	6.8
Incisive foramina, width	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.1	3.0	2.5	2.5	—	3.0	3.1
Length bulla	—	—	5.8	5.6	—	—	5.5
Crowns m ¹⁻³	6.4	6.6	6.6	5.9	5.3	6.3	5.5
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	3.0	3.1	3.5	3.0	—	3.1	2.6
m ¹ , breadth	2.0	2.1	2.1	2.0	1.8	2.0	1.8
m ² , length	1.8	1.9	1.7	1.7	—	1.8	1.6
m ² , breadth	1.9	2.0	2.0	1.9	—	1.9	1.7
m ³ , length	1.4	1.5	1.4	1.3	—	1.4	1.3
m ³ , breadth	1.5	1.5	1.6	1.5	—	1.5	1.3

<i>Pseudomys</i> (<i>Gyomys</i>)	<i>Pseudomys novaehollandiae</i> B.M. No. 43.2.24.1, type young ad.	<i>Pseudomys pumilus</i> , type Sydney, No. M.6032, ad. ♀	<i>Pseudomys glaucus</i> , type B.M. No. 92.8.7.2, ad. ♂	<i>Pseudomys albocinereus</i> , type B.M. No. 44.7.9.16, ad.	<i>Pseudomys albocinereus</i> C.N.H.M. No. 35332, young ♀	<i>Pseudomys a. squalorum</i> , type B.M. No. 6.10.5.6, ad. ♂	<i>Pseudomys apodemoides</i> , type Adelaide, No. M.3466, ad. ♀	<i>Pseudomys apodemoides</i> , paratype, ♂
Head and body	± 75	68	90	90	80	90	90	80
Tail	± 60	61	110	80	78	88	92	97
Hind foot (s.u.)	20.5	16.7	22	21	20	21	20.5	21
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	—	11	15	11.5	17	12	16	16
Skull: total length	—	20.8	28.9	—	23.5	25.0	—	25.8
Condylbasal length	—	—	—	—	—	—	—	—
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	12.3	11.0	14.1	14.4	11.5	12.3	—	—
Interorbital breadth	3.7	3.4	4.2	3.8	4.0	3.9	—	3.8
Interparietal	—	—	9.0	—	8.6	8.0	—	—
Breadth braincase	11.5	10.2	12.9	—	11.7	11.5	—	11.5
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	7.4	7.2	11.2	10.0	8.1	9.0	—	9.0
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	2.3	—	3.0	3.0	2.3	2.6	—	—
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	11.8	10.3	14.1	—	11.1	12.1	—	—
Incisive foramina, length	5.0	4.0	5.6	5.1	4.9	4.4	—	5.0
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.3	—	3.0	2.3	2.4	2.6	—	—
Length bulla	4.2	3.6	4.4	—	4.0	4.2	—	4.7
Crowns m ¹⁻³	3.9	3.5	4.2	4.0	4.1	3.6	—	3.8
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns, m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	1.9	—	2.0	1.9	2.1	1.8	—	—
m ¹ , breadth	1.2	1.0	1.4	1.4	1.4	1.2	—	—
m ² , length	1.2	—	1.2	1.2	1.2	1.1	—	—
m ² , breadth	1.1	—	1.3	1.3	1.3	1.1	—	—
m ³ , length	0.7	—	0.9	0.8	1.0	0.7	—	—
m ³ , breadth	0.9	—	1.0	1.0	1.0	0.9	—	—

<i>Pseudomys</i> (<i>Gyomys</i>)	<i>Pseudomys apodemoides</i> M.C.Z. No. 39652, young ♀	<i>Pseudomys berneyi</i> , type Sydney, No. M.6000, ad. ♂	<i>Pseudomys berneyi</i> , allotype Sydney, ad. ♀	<i>Pseudomys fumeus</i> , type Melbourne, No. C. 197, ad. ♂	<i>Pseudomys occidentalis</i> , type C.N.H.M. No. 34725, young ad.	<i>Pseudomys occidentalis</i> C.N.H.M. No. 34726, ad.	<i>Pseudomys desertor</i> , type Sydney, No. M.1306	<i>Pseudomys desertor</i> , topotype ♀
Head and body	60	95.5	99.5	115	±100	±110	±80	96
Tail	72	63.5	61.5	134	±100	±110	±88	94.5
Hind foot (s.u.)	19.5	19.0	19.0	29.0	26	29	21.5	21.7
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	—	13.5	14.0	22.0	—	—	11.5	11.6
Skull: total length	22.3	25.5	—	32.0	30.3	—	27.4	26.2
Condylbasal length	—	—	—	—	—	—	—	—
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	11.0	14.1	—	16.0	15.0	—	—	14.3
Interorbital breadth	3.6	3.6	3.9	5.0	4.1	4.3	3.8	3.7
Interparietal	6.7	—	—	—	7.7	—	—	9.6
Breadth braincase	10.7	12.0	—	14.0	13.0	—	12.9	12.8
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	7.7	8.2	—	11.8	11.0	11.7	9.5	9.3
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	2.3	—	—	—	3.0	3.7	—	3.2
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	11.4	13.9	—	15.8	14.6	15.5	14.1	14.0
Incisive foramina, length	5.0	5.8	5.4	6.0	5.1	5.6	4.4	3.9
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.6	—	—	—	3.0	3.2	—	—
Length bulla	4.3	5.2	—	—	5.1	5.2	5.4	—
Crowns m ¹⁻³	3.9	4.6	—	5.5	4.5	4.6	5.1	5.2
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.0	—	—	—	2.2	2.2	—	—
m ¹ , breadth	1.2	1.5	—	—	1.4	1.5	—	—
m ² , length	1.2	—	—	—	1.3	1.5	—	—
m ² , breadth	1.1	—	—	—	1.4	1.5	—	—
m ³ , length	0.9	—	—	—	1.1	1.1	—	—
m ³ , breadth	1.0	—	—	—	1.2	1.2	—	—

<i>Pseudomys</i> (<i>Thetomys</i>)	<i>Pseudomys nanus</i> , cotype B.M. No. 44.9.30.10, ad.	<i>Pseudomys ferculinus</i> , type B.M. No. 2.10.10.7, young ♀	<i>Pseudomys praeconis</i> , type B.M. No. 58.12.27.14, old ♀	<i>Pseudomys fieldi</i> , type Sydney, ad. ♀	<i>Pseudomys gracilicaudatus</i> , type B.M. No. 58.11.20.3, ad. ♂	<i>Pseudomys g. ultra</i> , type Sydney, No. M.6407, ad. ♀	<i>Pseudomys gouldii</i> , cotype B.M. No. 55.12.24.149, ad. ♀	" <i>nanus</i> " of Finlayson (1941) from near Musgrave Range
Head and body	100	95	105	103.5	110	110	105	101
Tail	93	95	130	122	95	105	±70	88
Hind foot (s.u.)	22.5	24	26	23.5	26.5	26	25.5	21.5
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	10	11	16	18.5	11	16	14	14
Skull: total length	28.7	26.4	—	—	—	31.4	—	26.6
Condylbasal length	—	—	—	—	—	—	—	—
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	—	14.1	14.7	—	—	16.8	—	14.3
Interorbital breadth	3.8	4.1	4.0	—	3.7	3.8	—	3.4
Interparietal	8.8	8.9	9.0	—	9.3	—	—	—
Breadth braincase	12.5	12.4	13.3	—	12.6	13.4	—	13.4
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	—	9.0	—	—	12.0	12.3	10.5	9.2
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	2.8	2.8	3.0	—	3.4	—	—	—
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	15.6	13.6	15.6	—	—	16.3	—	—
Incisive foramina, length	6.5	5.5	6.4	—	6.7	7.3	—	4.4
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.5	2.1	3.1	—	2.3	—	—	—
Length bulla	5.6	5.1	5.8	—	—	5.0	—	5.5
Crowns m ¹⁻³	5.6	5.3	4.7	5.0 ^a	6.1	5.8	— ^b	4.7
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.6	2.6	2.3	—	3.0	—	—	—
m ¹ , breadth	1.8	1.8	1.5	—	2.0	2.1	—	—
m ² , length	1.6	1.6	1.3	—	1.7	—	—	—
m ² , breadth	1.7	1.7	1.4	—	1.9	—	—	—
m ³ , length	1.2	1.1	1.1	—	1.5	—	—	—
m ³ , breadth	1.3	1.1	1.1	—	1.4	—	—	—

^a Lower m₁₋₃, 4.7 mm.^b Lower m₁₋₃, 5.05 mm.

<i>Leggadina</i>	<i>Leggadina forresti</i> , type B.M. No. 6.3.9.39, old ♀	<i>Leggadina waitei</i> , specimen B of Waite	<i>Leggadina waitei</i> ? A.M.N.H. No. 107392, ♂	<i>Leggadina messoria</i> , type B.M. No. 25.4.9.1, ad. ♂	<i>Leggadina delicatula</i> , cotype B.M. No. 42.5.26.17, ad.	<i>Leggadina delicatula</i> , cotype B.M. No. 42.5.26.18, ad.	<i>Leggadina delicatula</i> A.M.N.H. No. 154507, ♂ Cooktown	<i>Leggadina mimula</i> , type B.M. No. 26.3.11.174, ad. ♀
Head and body	90	84.3	—	67	60	55	64	65
Tail	62	—	—	53	55	—	73	69
Hind foot (s.u.)	19	16	—	18	16	17	18	17.5
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	10	11.8	—	7	6	8	9	9
Skull: total length	25.4	±24.8	23.0	23.6	—	—	21.5	21.4*
Condylbasal length	—	—	—	—	—	—	—	—
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	13.5	13.3	12.7	12.6	—	—	10.5	—
Interorbital breadth	3.8	3.8	3.6	3.5	3.3	3.4	3.5	3.5
Interparietal	8.0	8.3	8.0	7.6	—	—	6.3	—
Breadth braincase	11.3	11.8	11.5	11.0	—	—	10.0	10.0
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	8.5	8.5	—	7.6	7.0	7.4	7.1	7.0
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	2.7	2.6	2.4	2.2	2.0	2.2	2.4	—
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	14.1	13.0	12.7	12.8	—	—	10.7	—
Incisive foramina, length	5.6	4.3	4.9	5.6	4.1	4.5	4.1	—
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.6	—	2.4	2.2	1.7	—	2.3	—
Length bulla	5.0	—	4.9	4.7	—	—	3.7	—
Crowns m ¹⁻³	4.7	5.0	4.3	4.6	3.8	3.7	3.8	3.8
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.6	—	2.4	2.5	1.9	1.9	2.0	—
m ¹ , breadth	1.5	—	1.8	1.3	1.1	1.1	1.1	—
m ² , length	1.2	—	1.4	1.1	1.1	1.1	1.2	—
m ² , breadth	1.2	—	1.3	1.1	1.1	1.0	1.0	—
m ³ , length	0.7	—	0.8	0.7	0.6	0.7	0.7	—
m ³ , breadth	0.9	—	1.0	0.8	0.7	0.7	0.8	—

* Skull measurements from Thomas.

<i>Leggadina</i> and <i>Lorentzimys</i>	<i>Leggadina patria</i> , type B.M. No. 7.8.9.44, ad. ♀	<i>Leggadina hermannsburgensis</i> B.M. No. 97.1.8.2, paratype ad. ♀	<i>Leggadina hermannsburgensis</i> M.C.Z. No. 29400, tototype	<i>Leggadina h. bolami</i> , type Sydney, No. M.4938, ad. ♀ (from Troughton)	<i>Leggadina h. brazenori</i> , type Melbourne (from Troughton)	<i>Lorentzimys nouhuysii</i> , type Leiden field no. 319, old ♂	<i>Lorentzimys nouhuysii</i> , A.M.N.H. No. 105036, ♀	<i>Lorentzimys alicola</i> , type A.M.N.H. No. 150592, ad. ♂
Head and body	65	75	83	87	75	85	82	83
Tail	66	74	88	88	74	100	106	128
Hind foot (s.u.)	18	18.5	17.5	19.5	19	21.5	22	26
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	8	9.5	13	16	15.8	11.0	17	19
Skull: total length	22.6	—	23.2	23.7	—	—	—	—
Condylbasal length	—	—	—	—	—	20.5	—	21.9
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	11.0	11.8	11.2	12.3	—	12.7	13.0	12.5
Interorbital breadth	3.3	3.4	3.3	3.8	3.5	4.6	5.5	5.6
Interparietal	6.2	8.5	8.3	—	—	—	7.7	8.0
Breadth braincase	10.6	11.1	10.8	11.4	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	8.0	—	7.9	7.9	7.5	—	6.0	6.1
Nasals, greatest breadth	—	—	—	—	—	—	2.7	2.8
Zygomatic plate	2.1	2.1	2.3	—	—	1.2	1.7	1.8
Diastema	—	—	—	—	—	—	5.6	5.8
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	11.8	10.7	11.3	11.8	12.3	10.5	—	11.8
Incisive foramina, length	4.1	4.4	4.3	4.8	4.3	—	2.4	2.6
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.1	2.3	2.4	—	—	3.0	3.0	2.6
Length bulla	3.8	5.2	5.0	—	—	3.1	3.2	3.4
Crowns m ¹⁻³	4.2	3.6	3.8	3.7	3.5	2.6	2.5	2.8
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.2	1.9	2.0	—	—	1.2	1.3	1.4
m ¹ , breadth	1.2	1.2	1.2	—	—	0.8	1.0	0.9
m ² , length	1.1	1.0	1.1	—	—	0.7	—	0.9
m ² , breadth	1.1	1.1	1.1	—	—	0.8	—	0.9
m ³ , length	0.8	0.6	0.8	—	—	0.6	—	0.6
m ³ , breadth	0.8	0.7	0.9	—	—	0.6	—	0.7

<i>Leporillus</i> and <i>Mastacomys</i>	<i>Leporillus apicalis</i> , cotype B.M. No. 53.10.22.14, ad. ♀	<i>Leporillus apicalis</i> , cotype B.M. No. 53.10.22.15, young ♀	<i>Leporillus conditor</i> Sydney, No. M.3062 (from Troughton)	<i>Leporillus jonesi</i> , type B.M. No. 21.7.3.2, ad. ♀	<i>Leporillus jonesi</i> M.C.Z. No. 27997, ♂	<i>Mastacomys fuscus</i> , type B.M. No. 52.1.15.15, young ♀	<i>Mastacomys mordicus</i> , type B.M. No. 22.10.1.3
Head and body	200	185	—	190	—	150	—
Tail	160	—	—	170	—	95	—
Hind foot (s.u.)	43	43	44	47	—	32	—
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	29	25	—	24	—	14	—
Skull: total length	—	—	—	—	—	—	—
Condylobasal length	—	—	—	45.9	43.6	—	—
Condyllo-incisive length	—	—	—	—	—	—	—
Condylobasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	22	—	20.4	23.1	—	20.2	—
Interorbital breadth	5.5	—	—	5.6	5.5	4.0	—
Interparietal	—	—	—	—	—	—	—
Breadth braincase	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	—	—	—	—	—	—	—
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	4.8	4.5	—	5.9	5.0	4.3	3.1
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	23.6	—	—	24.8	23.4	20.8	—
Incisive foramina, length	9.9	—	9.2	8.5	9.0	7.5	—
Incisive foramina, width	—	—	—	—	—	—	—
Breadth meso-pter. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.05	—	—	3.9	3.9	1.6	—
Length bulla	—	—	—	8.4	8.0	5.8	—
Crowns m ¹⁻³	8.6	9.1	9.3	9.5	9.0	10.0 ^a	8.7 ^b
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	4.0	4.5	—	4.3	4.0	4.6	4.4
m ¹ , breadth	2.7	2.6	—	2.6	2.7	3.3	3.0
m ² , length	2.3	2.3	—	2.7	2.4	2.5	2.4
m ² , breadth	2.7	2.5	—	2.7	2.6	3.2	3.2
m ³ , length	2.1	2.1	—	2.3	2.2	2.7	2.3
m ³ , breadth	2.4	2.4	—	2.2	2.4	2.7	2.7

^a Wear surface, 8.1 mm.^b Wear surface, 6.9 mm.

<i>Notomys</i>	<i>Notomys mitchellii</i> , cotype Sydney, No. R.74	<i>Notomys mitchellii</i> Melbourne, No. R.2186, ♀	<i>Notomys mitchellii</i> Melbourne, No. R.1767/8	<i>Notomys mitchellii</i> Melbourne, No. R.13835	<i>Notomys m. macropus</i> , type B.M. No. 55.12.24.361 unsexed ad.	<i>Notomys m. alutacea</i> , type Melbourne, No. C.38, ♀	<i>Notomys gouldii</i> , type B.M. No. 7.1.1.135, old ad.	<i>Notomys gouldii</i> C.N.H.M. No. 36051, ♂
Head and body	—	112	107	—	115	98	115	±120
Tail	110	148	133	—	150	145	135	±150
Hind foot (s.u.)	35	36	35	—	37	37	36	36
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	14	—	—	—	18	—	21	—
Skull: total length	—	—	—	—	—	31.8	—	32.3
Condylobasal length	—	—	—	—	—	—	—	—
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	—	—	—	—	—	15.9	15.1	16.0
Interorbital breadth	—	—	5.0	—	5.2	5.6	5.3	5.5
Interparietal	—	—	—	—	—	9.1	—	8.0
Breadth braincase	—	—	—	—	—	15.1	14.2	15.0
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	—	—	10.5	11.5	—	12.0	10.6	12.0
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	—	—	—	—	2.9	2.7	3.4	3.1
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	15.7	—	14+	14.0	16.1	15.5	15.8	16.5
Incisive foramina, length	6.1	—	5.0	5.5	5.9	5.4	6.0	6.0
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.1	—	—	—	3.0	2.8	3.0	3.3
Length bulla	—	—	—	—	—	5.5	—	6.0
Crowns m ¹⁻³	5.0	—	5.2	5.0	5.1	4.9	5.4	5.4
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.6	—	—	—	2.6	2.4	2.8	2.7
m ¹ , breadth	1.8	—	—	—	1.7	1.9	1.8	1.8
m ² , length	1.6	—	—	—	1.6	1.5	1.6	1.7
m ² , breadth	1.6	—	—	—	1.6	1.7	1.7	1.6
m ² , length	1.0	—	—	—	1.1	1.2	1.2	1.2
m ³ , breadth	1.2	—	—	—	1.2	1.1	1.3	1.2

<i>Notomys</i>	<i>Notomys alexis</i> , type B.M. No. 6.3.9.65, old ♀	<i>Notomys alexis</i> M.C.Z. No. 14881, ♀	<i>Notomys a. reginae</i> , type Brisbane, field no. 54, young ♂	<i>Notomys a. everardensis</i> A.M.N.H. No. 107399, ad. ♂	<i>Notomys richardsonii</i> , type B.M. No. 43.8.21.3, ad. ♂	<i>Notomys aquilo</i> , type B.M. No. 67.9.17.2, old ♂	<i>Notomys cervinus</i> , type B.M. No. 53.10.22.7, ad. ♀?	<i>Notomys aistoni</i> , type Melbourne, No. R.13740, old ♂
Head and body	109	83	91	—	115	105	98	104
Tail	135	119	117	—	140	90+	—	149
Hind foot (s.u.)	31	32	29.5	—	35	35	33	34
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	16	20	19	—	20	16	22	—
Skull: total length	—	32	—	29.7	—	—	—	30
Condylbasal length	—	—	—	—	—	—	—	—
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	16.0	14.5	13.0	14.5	16.8	14.0	—	—
Interorbital breadth	5.1	5.2	4.6	4.9	5.1	5.0	5.6	6.4
Interparietal	7.8	7.0	—	7.4	—	—	7.3	7.4
Breadth braincase	14.8	13.6	—	14.2	15.0	—	—	14.4
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	—	9.6	10.4	10.0	11.8	10.8	—	9.7
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	2.9	2.9	2.6	2.7	3.2	3.2	2.5	2.4
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	15.9	14.7	14.5	14.8	—	15.0	14.1	—
Incisive foramina, length	4.5	5.0	5.2	5.4	5.7	5.7	6.2	5.9
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.1	2.9	—	3.0	3.2	3.1	—	3.3
Length bulla	6.2	—	5.9	6.2	—	—	—	5.7
Crowns m ¹⁻³	5.2	5.2	4.8	4.8	4.9	5.1	4.9	4.9
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.7	2.7	—	2.6	2.3	2.4	2.5	2.3
m ¹ , breadth	1.8	1.8	1.8	1.8	1.7	1.6	1.7	1.8
m ² , length	1.6	1.5	—	1.3	1.5	1.5	1.4	1.5
m ² , breadth	1.6	1.6	—	1.5	1.5	1.4	1.5	1.7
m ³ , length	1.0	1.0	—	1.1	1.0	1.1	0.9	0.9
m ³ , breadth	1.2	1.1	—	1.2	1.2	1.1	1.2	1.1

<i>Notomys and Zyzomys (Zyzomys)</i>	<i>Notomys fuscus</i> , cotype? ♂	<i>Notomys sturlii</i> , type B.M. No. 46.5.14.40, ad. ♀	<i>Notomys megalotis</i> , type B.M. No. 44.7.9.14, ad.	<i>Notomys mordax</i> , type B.M. No. 46.4.4.65, ad.	<i>Notomys longicaudatus</i> , type B.M. No. 44.7.9.15, old ♀	<i>Notomys longicaudatus</i> A.M.N.H. No. 107400, ♀ Barrow Creek	<i>Notomys amplius</i> , type Melbourne, No. C.512, ad. ♀	<i>Zyzomys argurus</i> , type B.M. No. 86.8.26.6, young ♀ "S. Australia"
Head and body	110	128	118	—	145	—	143	85
Tail	125	200	130	—	210	—	153	105
Hind foot (s.u.)	34	44	40.3	—	46	—	43	22
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	—	—	25	—	22	—	25	12
Skull: total length	30.0	—	—	33.1	39.0	38.5	40.4	—
Condylbasal length	—	—	—	—	—	—	—	27.2
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	16.0	—	17.5	—	—	21.2	21.3	14.1
Interorbital breadth	5.5	6.4	6.1	5.9	6.6	6.0	6.6	4.7
Interparietal	—	—	—	8.0	7.3	7.8	10.3	9.0
Breadth braincase	—	—	15.4	15.7	—	17.8	16.6	13.2
Mastoid breadth	—	—	—	—	—	—	—	10.9
Nasals, length	10.0	12.9	12.0	12.0	15.0	14.4	15.4	11.0
Nasals, greatest breadth	—	—	—	—	—	—	—	3.2
Zygomatic plate	—	3.6	3.4	3.5	3.9	4.0	4.5	2.9
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	15.0	—	15.8	17.3	20.2	20.7	21.4	15.6
Incisive foramina, length	—	7.3	6.6	6.7	8.6	8.0	7.9	5.5
Incisive foramina, width	—	—	—	—	—	—	—	1.8
Breadth meso-pter. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	—	3.2	3.6	3.4	4.3	4.3	3.1	2.9
Length bulla	—	—	—	5.9	9.0	9.0	8.1	4.3
Crowns m ¹⁻³	5.0	5.5	5.6	6.2	6.6	6.6	7.5	5.2
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	—	2.8	2.7	3.4	3.3	3.6	4.0	2.9
m ¹ , breadth	—	2.0	1.8	2.2	2.2	2.4	2.6	1.4
m ² , length	—	1.6	1.7	1.6	1.8	1.9	2.4	1.6
m ² , breadth	—	1.9	1.6	1.9	2.0	2.2	2.5	1.4
m ³ , length	—	1.1	1.1	1.3	1.5	1.3	1.9	1.0
m ³ , breadth	—	1.5	1.3	1.5	1.5	1.5	2.0	1.0

<i>Zyzomys</i> (<i>Zyzomys</i>) and <i>Zyzomys</i> (<i>Laomys</i>)	<i>Zyzomys argurus indutus</i> , type B.M. No. 9.4.23.3, ad. ♂ E. Kimberley	<i>Zyzomys a. indutus</i> A.M.N.H. No. 162653, ad. ♂ Rifle Creek, N.W.Q.	<i>Zyzomys a. indutus</i> A.M.N.H. No. 162654, ad. ♀ Rifle Creek, N.W.Q.	<i>Zyzomys a. indutus</i> A.M.N.H. No. 162659, old ♀ Rifle Creek, N.W.Q.	<i>Zyzomys a. indutus</i> A.M.N.H. No. 155167, ad. ♂ Shipton's Flat	<i>Zyzomys pedunculatus</i> , cotype B.M. No. 97.1.8.5, young ad. ♀ central Australia	<i>Zyzomys pedunculatus</i> A.M.N.H. No. 107403, ad. ♂ Alice Springs	<i>Zyzomys woodwardi</i> , type B.M. No. 9.2.16.3, ad. ♀ E. Kimberley
Head and body	107	105	106	113	±100	125	—	167
Tail	96	—	126	120	±120	100	105	114
Hind foot (s.u.)	22.5	22	21	22	23.4	27	26.5	30
Hind foot (c.u.)	—	—	—	—	24.5	—	—	—
Ear	13	14	13.5	14	±10.5	13	—	16
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	30.2	28.0	28.3	27.5	30.1	32	30.2	38
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	15.0	14.2	14.6	13.9	14.9	17	16.7	21.2
Interorbital breadth	4.7	4.5	4.6	4.3	4.8	5.0	5.2	5.1
Interparietal	9.0	8.9	9.3	8.0	8.2	9.2	8.6	10.5
Breadth braincase	13.2	13.5	13.6	12.5	14.0	15.1	15.4	17
Mastoid breadth	11.5	11.2	11.2	10.9	11.7	12.6	13.0	14.2
Nasals, length	11.0	11.1	11.2	10.3	11.0	12.8	11.6	13.6
Nasals, greatest breadth	2.9	3.4	3.1	2.9	3.0	3.7	3.3	3.9
Zygomatic plate	3.1	2.9	2.8	2.6	3.0	3.3	3.0	5.1
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	16.3	15.7	15.9	15.3	16.7	18.2	17.1	21.5
Incisive foramina, length	6.4	6.0	5.8	6.0	6.7	7.2	6.7	8.0
Incisive foramina, width	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.8
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.1	2.9	2.9	2.9	3.2	2.7	3.0	3.5
Length bulla	4.5	4.4	4.5	4.4	4.6	5.2	5.5	4.8
Crowns m ¹⁻³	5.3	5.1	5.2	4.8	5.6	6.0	6.5	6.7
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.6	2.8	2.7	2.5	3.0	3.3	3.5	3.5
m ¹ , breadth	1.5	1.5	1.4	1.4	1.6	2.0	2.1	2.2
m ² , length	1.7	1.5	1.6	1.5	1.8	1.7	1.8	2.1
m ² , breadth	1.5	1.4	1.4	1.3	1.5	1.9	2.0	2.2
m ³ , length	1.1	1.0	1.1	1.0	1.2	1.1	1.3	1.4
m ³ , breadth	1.1	1.1	1.0	1.0	1.3	1.6	1.6	1.6

<i>Mesembriomys</i>								
	<i>Mesembriomys gouldii</i> , type B.M. No. 42.5.26.18, young ♂	<i>Mesembriomys gouldii</i> B.M. 97.4.12.5, ♀	<i>Mesembriomys g. melvilleensis</i> B.M. No. 35.11.30.1, type, young ♂	<i>Mesembriomys g. rattoides</i> B.M. No. 1.3.4.1, type, ad. ♀	<i>Mesembriomys g. rattoides</i> A.M.N.H. No. 108941, ♀	<i>Mesembriomys g. rattoides</i> A.M.N.H. No. 108942, ♂	<i>Mesembriomys g. rattoides</i> A.M.N.H. No. 108943, ♀	<i>Mesembriomys g. rattoides</i> A.M.N.H. No. 154510, young ♂
Head and body	300	330	280	300	291	296	296	238
Tail	340	370	346	360	373	257+	350	317
Hind foot (s.u.)	—	63	68	69	70	70	71	70
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	—	36	30	34	43?	45?	43?	37
Skull: total length	—	—	—	—	—	—	—	—
Condylobasal length	—	61.3	63.6	—	64.5	66.7	66.4	—
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylobasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	31	33.5	31	31.6	32.8	33.6	32.3	28.0
Interorbital breadth	—	—	—	—	—	—	—	—
Interparietal	—	—	—	—	—	—	—	—
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	—	—	—	—	—	—	—	—
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	9.3	11.2	8.6	11.1	11.0	12.6	12.0	9.1
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	—	37.3	36.7	37.8	38.0	40.0	39.3	32.6
Incisive foramina, length	11.0	12.3	11.2	12.4	13.0	12.7	13.5	10.7
Incisive foramina, width	4.0	3.8	3.8	4.3	3.5	3.9	4.0	3.9
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	5.5	6.9	5.8	6.9	7.1	6.4	7.3	6.2
Length bulla	9.0	9.0	8.3	9.0	8.9	8.9	8.6	8.2
Crowns m ¹⁻³	12.0	12.0	11.0	10.5	11.6	12.3	11.5	12.4
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	6.2	6.0	5.6	5.3	5.8	6.3	5.8	6.4
m ¹ , breadth	3.6	3.6	3.1	3.1	3.4	3.5	3.4	3.7
m ² , length	3.7	3.5	3.2	3.1	3.6	3.5	3.5	3.6
m ² , breadth	3.2	3.4	3.1	2.9	3.0	3.2	3.2	3.4
m ³ , length	2.3	2.6	2.2	2.1	2.5	2.6	2.5	2.6
m ³ , breadth	2.4	2.8	2.6	2.3	2.4	2.6	2.6	2.7

<i>Mesembriomys</i> and <i>Conilurus</i>	<i>Mesembriomys macrurus</i> B.M. No. 4.1.3.17, young ♀	<i>Mesembriomys macrurus</i> B.M. No. 4.1.3.18, ♀	<i>Conilurus albipes</i>	<i>Conilurus constructor</i> B.M. No. 42.6.29.8, ad. ♀ "Adelaide"	<i>Conilurus penicillatus</i> , type B.M. No. 42.5.26.13, ad. ♂	<i>Conilurus penicillatus</i> U.S.N.M. No. 141485, young ♂	<i>Conilurus penicillatus</i> U.S.N.M. No. 141486, ♂
Head and body	240	—	—	240	170	170	190
Tail	370	—	—	220	170	180	150+
Hind foot (s.u.)	54	—	56	55	42	41.2	44.5
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	25	—	—	24	14	—	—
Skull: total length	—	—	—	—	—	—	—
Condylbasal length	—	± 53	—	± 45	—	—	± 41
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	27.0	27.5	—	25.0	—	21.0	23.5
Interorbital breadth	—	—	—	7.0	6.5	5.9	6.2
Interparietal	—	—	—	10.0	—	10.0	8.7
Breadth braincase	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	—	—	—	—	—	—	—
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	7.2	7.9	—	5.1	5.3	5.1	5.7
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	28.5	29.6	—	26.5	—	21.1	23.0
Incisive foramina, length	9.7	10.7	—	10.5	8.9	7.5	9.5
Incisive foramina, width	3.4	3.5	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	4.8	5.6	—	4.6	4.5	3.8	3.5
Length bulla	—	—	—	6.9	—	—	6.4
Crowns m ¹⁻³	8.8	8.8	—	9.5	7.3	7.9	8.2
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	4.3	4.5	—	4.5	3.6	4.2	4.2
m ¹ , breadth	2.7	2.7	—	2.9	2.4	2.8	2.8
m ² , length	2.8	2.6	—	2.8	2.2	2.3	2.5
m ² , breadth	2.6	2.6	—	2.7	2.3	2.6	2.6
m ³ , length	1.8	1.9	—	2.0	1.5	1.7	1.8
m ³ , breadth	1.9	2.0	—	2.1	1.8	2.0	2.0

<i>Conilurus</i>	<i>Conilurus penicillatus</i> U.S.N.M. No. 141487, ♂	<i>Conilurus penicillatus</i> B.M. No. 26.3.11.170, ♂ Groote Eylandt	<i>Conilurus melibius</i> , type B.M. No. 13.6.28.36, young ♀	<i>Conilurus hemileucus</i> , type B.M. No. 57.10.24.17, ad. ♂	<i>Conilurus randi</i> , type A.M.N.H. No. 105636, typead. ♀
Head and body	—	—	154	195	193
Tail	—	—	177	155	171+
Hind foot (s.u.)	42.6	—	37.5	46.0	48.0
Hind foot (c.u.)	—	—	—	—	—
Ear	—	—	18	13	22
Skull: total length	—	—	—	—	—
Condylbasal length	40.0	39.5	35.7	40.5	44.3
Condyl-incisive length	—	—	—	—	—
Condylbasilar length	—	—	—	—	—
Occipitonasal length	—	—	—	—	—
Basal length	—	—	—	—	—
Basilar length	—	—	—	—	—
Zygomatic breadth	21.9	22.5	20.7	23.0	24.4
Interorbital breadth	6.0	6.3	6.4	6.5	6.8
Interparietal	9.2	9.0	7.6	9.5	8.9
Breadth braincase	—	—	—	—	—
Mastoid breadth	—	—	—	—	—
Nasals, length	—	—	—	—	—
Nasals, greatest breadth	—	—	—	—	—
Zygomatic plate	5.9	5.7	5.1	6.2	6.2
Diastema	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—
Palatilar length	—	—	—	—	—
Palatal length	22.5	22.8	20.3	23.3	25.4
Incisive foramina, length	9.0	8.4	8.5	8.4	11.1
Incisive foramina, width	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—
Width inside m ¹ -m ¹	3.7	3.2	3.7	3.9	4.4
Length bulla	6.5	6.3	6.0	6.6	7.3
Crowns m ¹⁻³	8.2	7.8	7.3	8.6	9.0
Alveoli m ¹⁻³	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—
m ¹ , length	4.2	3.9	3.6	4.3	4.4
m ¹ , breadth	2.9	2.7	2.4	2.9	3.1
m ² , length	2.5	2.3	2.0	2.5	2.7
m ² , breadth	2.7	2.5	2.4	2.7	3.0
m ³ , length	1.8	1.6	1.5	1.8	1.9
m ³ , breadth	2.1	1.8	1.7	2.2	2.6

<i>Macruromys</i>	<i>Macruromys elegans</i> , type Berlin, No. 44393, ad. ♂	<i>Macruromys elegans</i> A.M.N.H. No. 103253, ♀ Weyland Mts.	<i>Macruromys major</i> , type B.M. field no. F.S.M.317, ad. ♀	<i>Macruromys major</i> A.M.N.H. No. 152066, ad. ♂	<i>Macruromys major</i> A.M.N.H. No. 152067, ♂	<i>Macruromys major</i> A.M.N.H. No. 152068, ♂	<i>Macruromys major</i> A.M.N.H. No. 152069, ♀
Head and body	155	158	225	249	241	238	247
Tail	220	207	340	326	333	315	336
Hind foot (s.u.)	—	—	—	—	—	—	—
Hind foot (c.u.)	37	37	59	56	57	56	56
Ear	15	21?	13	18	18	17	16
Skull: total length	—	—	—	—	—	—	—
Condylbasal length	35.2	34.6	49.2	51.3	49.7	49.8	49.8
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	18.3	17.3	24.9	25.8	25.0	25.7	26.0
Interorbital breadth	6.5	6.0	7.7	7.7	8.0	8.0	8.0
Interparietal	10.0	8.9	12.9	12.3	12.5	11.7	12.0
Breadth braincase	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	—	—	—	—	—	—	—
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	1.6	1.7	3.0	2.6	2.4	3.0	2.6
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	18.1	18.0	25.8	27.0	25.7	25.4	25.8
Incisive foramina, length	4.2	4.7	7.5	7.8	7.2	7.8	7.3
Incisive foramina, width	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	4.4	4.5	6.5	6.1	6.3	6.4	6.9
Length bulla	4.1	4.4	4.6	5.0	5.5	5.4	5.1
Crowns m ¹⁻³	4.9	4.9	6.8	6.8	6.8	6.7	6.6
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	2.1	2.3	3.1	3.2	3.3	3.3	3.2
m ¹ , breadth	1.1	1.3	1.9	1.9	2.0	1.9	1.9
m ² , length	1.4	1.6	2.2	2.1	2.1	2.0	2.1
m ² , breadth	1.1	1.2	1.8	1.9	1.9	1.8	1.8
m ³ , length	1.6	1.1	1.5	1.6	1.4	1.4	1.4
m ³ , breadth	0.9	1.0	1.4	1.4	1.3	1.3	1.3

<i>Mallomys</i> and <i>Hyomys</i>	<i>Mallomys rothschildi</i> , type B.M. No. 97.12.6.6, ad. ♂	<i>Mallomys aroensis</i> , type Brisbane, No. 2814, young ad. ♀	<i>Mallomys hercules</i> , type B.M. No. 12.1.31.1, ad. ♂	<i>Mallomys weylendi</i> , type Tring F.S.M. No. 95, ad. ♀	<i>Mallomys argentea</i> , type B.M. No. 33.6.1.33, young ♀	<i>Hyomys meeki</i> , type B.M. No. 3.12.1.12, ad. ♀	<i>Hyomys goliath</i> , type Paris, No. 1066A, subad. ♀
Head and body	400	± 400	440	370	365	390	360
Tail	385	365	400	390	420	350	300
Hind foot (s.u.)	63.5	65.0	68.0	72.0	71.0	64.0	64.0
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	15	13	17	19	18	20	18.5
Skull: total length	—	—	—	—	—	—	—
Condylbasal length	—	74.0	75.1	73.6	70.2	73.8	71.3
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	37.0	41.0	40.8	38.0	35.8	41.2	36.3
Interorbital breadth	10.0	10.0	11.5	10.4	11.0	9.2	9.9
Interparietal	16.0	—	14.2	12.7	—	14.5	13.8
Breadth braincase	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	—	—	—	—	—	—	—
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	8.5	9.5	8.4	8.0	7.7	9.6	7.7
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	40	41	43	40.7	38.7	42	42
Incisive foramina, length	13.9	15.5	15.8	15.0	14.2	8.6	7.6
Incisive foramina, width	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.4	—	4.1	3.8	3.3	6.0	4.0
Length bulla	7.4	9.0	7.5	7.8	7.5	7.3	—
Crowns m ¹⁻³	16.4	17.0	17.5	16.6	16.5	17.5	16.5
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	8.0	7.0	8.6	7.7	7.8	6.2	—
m ¹ , breadth	5.5	5.0	5.5	5.4	5.7	5.9	5.4
m ² , length	4.3	4.5	4.8	4.6	4.8	4.6	4.2
m ² , breadth	5.1	5.0	5.3	5.1	5.3	5.7	5.4
m ³ , length	3.9	5.0	4.3	4.5	4.3	5.7	3.8
m ³ , breadth	4.0	4.5	4.5	4.2	4.5	4.9	4.6

<i>Hyomys</i>	<i>Hyomys dammermani</i> , type Berlin, No. 44408, ad. ♀	<i>Hyomys dammermani</i> A.M.N.H. No. 103274, ♀	<i>Hyomys dammermani</i> A.M.N.H. No. 151337, young ♂	<i>Hyomys dammermani</i> A.M.N.H. No. 151349, ♂	<i>Hyomys strobilurus</i> , type Berlin, No. 34356, ad. ♀	<i>Hyomys strobilurus</i> A.M.N.H. No. 79781, ♂	<i>Hyomys strobilurus</i> A.M.N.H. No. 79780, young ♂
Head and body	306	302	325	295	± 340	356	330
Tail	308	299	285	256	± 270	381	282
Hind foot (s.u.)	53.0	57.0	56.0	57.0	—	± 60	± 60
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	—	28	25	25	± 20	—	—
Skull: total length	—	—	—	—	—	—	—
Condylbasal length	61.6	67.0	65.6	64.0	—	74.7	64.0
Condyl-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	36.2	34.7	38.0	36.3	—	43.0	35.7
Interorbital breadth	9.0	9.5	9.3	9.6	—	10.3	9.8
Interparietal	12.0	12.5	12.8	11.4	—	12.7	12.8
Breadth braincase	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	—	—	—	—	—	—	—
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	8.6	8.2	8.0	9.5	—	11.0	8.3
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	37.0	35.7	37.5	36.5	—	44.5	37.8
Incisive foramina, length	7.5	7.4	8.0	7.6	—	7.8	7.8
Incisive foramina, width	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.9	3.6	3.5	5.0	—	5.2	4.0
Length bulla	6.1	6.6	6.7	6.9	—	7.0	6.6
Crowns m ¹⁻³	14.9	16.3	16.6	16.5	—	17.0	17.0
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	5.5	6.2	7.7	6.8	—	6.6	8.5
m ¹ , breadth	5.1	5.0	5.0	5.0	—	5.6	5.8
m ² , length	3.8	3.9	4.0	4.1	—	4.6	4.4
m ² , breadth	5.1	4.9	5.2	5.4	—	5.7	5.9
m ³ , length	4.3	4.5	4.2	5.0	—	5.3	4.2
m ³ , breadth	4.2	4.2	4.5	4.3	—	5.1	5.4

<i>Anisomys</i>	<i>Anisomys imitator</i> , type B.M. No. 3.12.1.10, ad. ♂	<i>Anisomys imitator</i> A.M.N.H. No. 79779, ♂ Saruwaged	<i>Anisomys imitator</i> A.M.N.H. No. 151477, young ♂ Habbema area	<i>Anisomys imitator</i> A.M.N.H. No. 152065, ♂ Idenburg Valley, 4000 ft.	<i>Anisomys imitator</i> A.M.N.H. No. 151400, ♀ Habbema area, 7000 ft.	<i>Anisomys imitator</i> A.M.N.H. No. 103265, ♀ Weyland Mts.
Head and body	285	±280	249	261	268	244
Tail	285	±305	296	335	322	314
Hind foot (s.u.)	61.0	±66	61	61.0	63.0	61.0
Hind foot (c.u.)	—	—	—	—	—	—
Ear	16	—	20	20	20	22
Skull: total length	—	—	—	—	—	—
Condylbasal length	64.0	62.0	56.3	61.5	61.0	55.8
Condyllo-incisive length	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—
Basal length	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—
Zygomatic breadth	34.7	34.6	29.7	31.0	30.2	30.0
Interorbital breadth	10.9	11.4	9.8	8.6	9.9	10.4
Interparietal	13.4	14.5	13.7	13.5	13.6	15.3
Breadth braincase	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—
Nasals, length	—	—	—	—	—	—
Nasals, greatest breadth	—	—	—	—	—	—
Zygomatic plate	9.3	9.3	7.2	8.2	8.0	8.2
Diastema	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—
Palatal length	38.8	37.4	34.0	37.3	36.6	34.0
Incisive foramina, length	3.5	4.0	4.1	3.8	4.0	4.5
Incisive foramina, width	—	—	—	—	—	—
Breadth meso-pter. fossa	—	—	—	—	—	—
Width inside m ¹ -m ¹	6.1	5.6	5.5	5.6	5.3	5.3
Length bulla	6.3	5.9	5.8	5.6	6.0	5.8
Crowns m ¹⁻³	10.5	10.2	10.0	10.1	10.0	9.9
Alveoli m ¹⁻³	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—
m ¹ , length	4.5	4.7	4.2	4.1	4.1	4.2
m ¹ , breadth	2.8	3.0	2.7	2.7	2.9	2.8
m ² , length	3.5	3.5	3.0	3.6	3.2	3.2
m ² , breadth	2.9	3.0	3.0	2.8	2.9	2.9
m ³ , length	2.2	2.2	2.5	2.6	2.3	2.2
m ³ , breadth	2.2	2.6	2.3	2.2	2.5	2.3

<i>Pogonomys</i> (<i>Pogonomys</i>)	<i>Pogonomys sylvestris</i> , type B.M. No. 11.10.13.6, old ♂	<i>Pogonomys macrourus</i> , type Paris, No. (1473) 1104, 1877 ad. sex uncertain	<i>Pogonomys lepidus</i> , type B.M. No. 97.8.7.51, ad. ♂	<i>Pogonomys l. huon</i> , type A.M.N.H. No. 79763, ♂	<i>Pogonomys l. derimapa</i> , type A.M.N.H. No. 101963, ad. ♀	<i>Pogonomys mollipilosus</i> , type Genoa, No. C.E.3491, young ad. ♂	<i>Pogonomys loriae</i> , type B.M. No. 97.8.7.47, ad. ♂	<i>Pogonomys dryas</i> , type B.M. No. 4.4.10.6, ad. ♀
Head and body	110	±110	120	135?	112	±95	148	110
Tail	160	±150	165	±185	174	±180	214	180
Hind foot (s.u.)	22.0	21.0	23.0	22	23	23	27	23.5
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	10	7	9	—	14	10	10.5	16
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	28	28	29.7	29	29.8	29.3	36	31.5
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	16.1	15.9	17.4	16.4	17.2	17.4	21.3	18.8
Interorbital breadth	3.9	4.4	4.6	4.4	4.5	4.4	5.2	4.6
Interparietal	—	9.0	8.8	—	9.2	10.1	11	8.0
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	11	—	9.8	10.4	8.3	9.7	12.8	10
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	3.0	2.7	3.0	3.3	3.2	3.3	3.6	3.1
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	15.8	15.0	15.8	13.5	16.2	15.5	20.3	16.9
Incisive foramina, length	3.8	3.3	4.6	3.9	3.3	4.3	5.0	4.0
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.2	3.2	3.2	3.1	3.2	3.1	3.5	3.4
Length bulla	—	4.3	4.6	4.2	4.2	4.6	4.5	4.6
Crowns m ¹⁻³	4.8	5.0	4.9	5.2	5.2	5.8	6.6	6.1
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.1	2.3	2.1	2.4	2.3	2.7	3.0	2.8
m ¹ , breadth	1.7	1.6	1.7	1.8	1.7	1.9	2.1	2.0
m ² , length	1.6	1.6	1.5	1.6	1.7	1.9	2.0	1.9
m ² , breadth	1.6	1.7	1.6	1.6	1.7	1.8	2.0	1.9
m ³ , length	1.1	1.2	1.2	1.3	1.3	1.2	1.6	1.3
m ³ , breadth	1.2	1.2	1.2	1.3	1.2	1.3	1.7	1.4

<i>Pogonomys</i> (<i>Chiruromys</i>)	<i>Pogonomys forbesi</i> , type B.M. No. 88.3.16.2, ad. ♀	<i>Pogonomys pulcher</i> , type B.M. No. 95.5.8.5, ad. ♂	<i>Pogonomys vulturnus</i> , type B.M. No. 97.8.7.64, ad. ♀	<i>Pogonomys mambatus</i> , type B.M. No. 7.2.1.10, ad. ♂	<i>Pogonomys satisfactus</i> , type A.M.N.H. No. 79828, ad. ♂	<i>Pogonomys major</i> , type A.M.N.H. No. 79831, ad. ♀	<i>Pogonomys lamia</i> , cotype B.M. No. 97.8.7.65, ad. ♂	<i>Pogonomys vates</i> , type B.M. No. 8.10.8.7, young ♂
Head and body	145	150	137	175?	—	—	115	120
Tail	225	235	225	235	225	245	160	183
Hind foot (s.u.)	30	33	32	31	37	37	25.5	26.0
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	16	16	11	12	—	—	15	12
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	36.3	36.9	35.8	36.6	—	36.4	29.9	29.6
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	22.8	22.1	21.6	22.0	21.7	22.1	19.9	17.6
Interorbital breadth	5.8	5.8	5.6	5.9	6.1	5.8	4.8	4.9
Interparietal	10.0	10.3	10.7	11.5	—	12.0	11.3	9.7
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	12.9	—	13.1	12.5	11.6	11.0	9.0	10.0
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	3.8	3.9	3.9	4.0	—	3.9	3.3	3.2
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	19.8	18.7	19.6	19.5	—	18.7	15.6	15.7
Incisive foramina, length	5.3	5.2	4.6	4.8	3.9	4.2	4.2	3.8
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.5	3.3	3.7	3.6	3.7	3.5	—	3.1
Length bulla	4.9	5.3	5.0	5.2	4.8	4.9	4.6	4.3
Crowns m ¹⁻³	5.6	5.8	5.9	5.7	6.0	6.0	4.9	4.5
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.4	2.5	2.6	2.5	2.6	2.7	2.1	2.0
m ¹ , breadth	1.7	1.8	1.8	1.8	1.9	1.9	1.5	1.4
m ² , length	1.6	1.7	1.9	1.7	—	1.8	1.4	1.3
m ² , breadth	1.6	1.7	1.7	1.8	—	1.9	1.5	1.3
m ³ , length	1.3	1.3	1.4	1.4	—	1.5	1.2	1.1
m ³ , breadth	1.2	1.4	1.4	1.4	—	1.5	1.1	1.1

<i>Xenuromys</i> and <i>Melomys</i> (White-toothed)	<i>Xenuromys barbatus</i> , type Paris, No. 1900-398/1066B ad. ♂	<i>Xenuromys guba</i> , type A.M.N.H. No. 152043, ad. ♂	<i>Melomys fellousi</i> , type B.M. field no. S.M.695, ♂	<i>Melomys fellousi</i> B.M. No. 47.1174, ♂	<i>Melomys fellousi</i> B.M. No. 47.1181, ♀	<i>Melomys albidens</i> , type A.M.N.H. No. 150821, ad. ♂	<i>Melomys albidens</i> A.M.N.H. No. 150531, ♂	<i>Melomys albidens</i> A.M.N.H. No. 150541, ♂
Head and body	± 275	310	141	150	147	122	119	111
Tail	± 220	281	190	207	184	162	144	162
Hind foot (s.u.)	58	66	29.5	31	30	26	24	26
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	—	25	19.5	20	20	22	19	21
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	54.8	62.2	31.1	33.0	32.7	27.4	26.0	27.8
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	25.4	29.0	15.4	16.3	16.0	15.6	15.4	14.9
Interorbital breadth	9.0	9.8	5.9	6.3	6.0	5.3	5.1	4.7
Interparietal	12.0	12.0	—	8.7	9.9	11.5	10.5	10.3
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	19.5	21.2	—	—	—	—	—	—
Nasals, length	—	—	12.5	12.6	12.3	9.8	10.0	10.5
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	3.8+ ^a	7.6	—	2.3	2.5	2.3	2.2	2.0
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	31.2	35.0	—	16.6	16.3	13.7	13.0	13.9
Incisive foramina, length	7.1	9.3	5.1	5.2	4.6	5.1	4.5	4.7
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pter. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	6.5	7.6	—	—	—	—	—	—
Length bulla	—	6.0	4.6	5.3	4.9	5.5	5.3	5.2
Crowns m ¹⁻³	11.2	11.8	—	6.5	6.3	5.3	5.1	5.1
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	6.1	5.7	—	3.4	3.1	2.6	2.7	2.6
m ¹ , breadth	3.1	3.3	1.9	2.1	2.0	1.5	1.6	1.7
m ² , length	3.5	3.8	—	2.0	2.0	1.6	1.7	1.7
m ² , breadth	3.0	3.0	—	2.0	1.9	1.5	1.6	1.5
m ³ , length	1.9	2.2	—	1.3	1.2	1.1	0.9	1.1
m ³ , breadth	1.9	2.1	—	1.4	1.3	1.2	1.1	1.2

^a Broken.

<i>Melomys levipes</i> Group	<i>Melomys l. lorentzii</i> , type Leiden, field no. 132, ad. ♂	<i>Melomys l. lanosus</i> , type B.M. No. 22.2.22.26, old ♀	<i>Melomys l. ratloides</i> , type B.M. No. 22.2.2.25, ad. ♂	<i>Melomys l. shawmayeri</i> , type B.M. field no. S.M.368, ad. ♂	<i>Melomys l. levipes</i> , cotype B.M. No. 97.8.7.72, ad. ♂	<i>Melomys l. meeki</i> , cotype B.M. No. 5.11.28.19, young ad. ♂
Head and body	165	175	210	168	145	145
Tail	55+	140	160	166	—	125
Hind foot (s.u.)	35	37	41	42	36	34
Hind foot (c.u.)	—	—	—	—	—	—
Ear	—	12.5	14.5	12.5	11.0	12.5
Skull: total length	—	—	—	—	—	—
Condylobasal length	39.3	38.2	42.9	38.9	37.0	34.3
Condyllo-incisive length	—	—	—	—	—	—
Condylobasilar length	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—
Basal length	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—
Zygomatic breadth	21.1	19.0	21.5	20.2	19.4	18.4
Interorbital breadth	7.1	7.6	7.5	6.4	6.3	6.6
Interparietal	10.3	10.5	10.5	10.1	10.7	9.0
Breadth braincase	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—
Nasals, length	15.0	15.5	17.0	15.8	14.5	12.3
Nasals, greatest breadth	—	—	—	—	—	—
Zygomatic plate	5.0	3.2	4.5	4.5	4.8	4.0
Diastema	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—
Palatal length	22.1	20.5	22.5	21.0	20.7	19.6
Incisive foramina, length	—	6.0	5.8	5.5	5.6	6.2
Incisive foramina, width	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—
Width inside m ¹ -m ¹	4.3	3.7	4.4	3.6	3.0	3.3
Length bulla	5.0	4.8	5.1	4.7	4.7	4.7
Crowns m ¹⁻³	8.1	7.9	8.4	8.0	7.7	7.7
Alveoli m ¹⁻³	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—
m ¹ , length	4.2	3.8	4.5	4.4	4.1	4.0
m ¹ , breadth	2.2	2.2	2.2	2.2	2.3	2.2
m ² , length	2.2	2.5	2.4	2.3	2.4	2.3
m ² , breadth	2.2	2.0	2.2	2.1	2.2	2.1
m ³ , length	1.1	1.2	1.3	1.1	1.1	1.1
m ³ , breadth	1.6	1.3	1.5	1.4	1.4	1.4

<i>Melomys lewipes</i> Group	<i>Melomys l. stevensi</i> , type M.C.Z. No. 29890, ad. ♂	<i>Melomys l. mollis</i> , type B.M. No. 13.6.18.35, ad. ♂	<i>Melomys l. naso</i> , type B.M. No. 11.11.11.54, ad. ♀	<i>Melomys l. clarae</i> , type Berlin, No. 45673, ad. ♂	<i>Melomys l. weylandi</i> , type Berlin, No. 45672, ad. ♂	<i>Melomys l. artakianus</i> , type B.M. No. 29.5.27.40, ad. ♀	<i>Melomys l. aereus</i> , type B.M. No. 20.7.26.24, ad. ♀
Head and body	151	161	168	168	157	152	150
Tail	142	140	145	121	144	139	138
Hind foot (s.u.)	35	36	36	32	34	34	30.5
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	10	11	11.5	—	—	13	12
Skull: total length	—	—	—	—	—	—	—
Condylbasal length	36.0	35.9	41.5	37.3	37.4	35.4	35.0
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	18.5	18.3	20.2	18.6	19.0	18.3	18.5
Interorbital breadth	6.3	7.0	6.6	7.0	6.4	6.9	5.5
Interparietal	9.0	10.0	9.7	10.0	11.0	9.9	9.7
Breadth braincase	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	13.6	13.7	16.0	14.1	13.0	13.1	14.0
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	4.5	4.0	5.0	3.9	4.3	3.4	4.4
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	20.5	19.9	23.3	21.0	21.1	19.2	19.1
Incisive foramina, length	5.5	5.7	6.7	6.7	5.6	5.8	6.4
Incisive foramina, width	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.8	3.7	4.4	3.9	3.8	3.0	3.1
Length bulla	4.5	5.0	4.5	5.1	4.8	5.4	5.4
Crowns m ¹⁻³	7.9	7.7	8.6	7.5	7.8	7.6	7.5
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	4.0	4.0	4.4	3.9	3.6	4.2	4.0
m ¹ , breadth	2.2	2.3	2.3	2.3	2.0	2.3	2.4
m ² , length	2.8	2.5	2.7	2.5	2.4	2.5	2.2
m ² , breadth	2.0	2.2	2.2	2.2	2.0	2.2	2.3
m ³ , length	1.0	1.1	1.3	1.2	1.1	1.0	1.2
m ³ , breadth	1.2	1.5	1.6	1.4	1.1	1.4	1.8

Melomys
cervinipes-moncktoni
Group

	<i>Melomys c. cervinipes</i> , cotype B.M. No. 52.12.15.1, ad. ♀	<i>Melomys c. cervinipes</i> , cotype B.M. No. 53.10.22.11	<i>Melomys c. cervinipes</i> A.M.N.H. No. 66009, ♂ Point Lookout Gorge, N.S.W.	<i>Melomys c. cervinipes</i> B.M. No. 53.10.22.10, ♂ Richmond River, N.S.W.	<i>Melomys c. eboreus</i> , type B.M. No. 22.12.18.11, ad. ♂	<i>Melomys c. eboreus</i> A.M.N.H. No. 154215, ♂, Ross- ville Creek, 30 mi. S. of Cooktown	<i>Melomys c. pallidus</i> , type Sydney, M.4379, ad. ♂	<i>Melomys c. banfieldi</i> , topotype B.M. No. 26.1.16.2, ♂
Head and body	± 150	—	122	—	135	147	136	130
Tail	155	—	161	—	145	—	144	150
Hind foot (s.u.)	31.5	—	29	—	29	28	28	31
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	14	—	—	—	11.5	17	17.5	8
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	—	—	31.5	—	32	35	—	35.7
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	17.7	19.5	17.6	17.6	17.3	18.7	—	17.9
Interorbital breadth	5.1	5.6	5.2	5.3	5.2	5.6	5.3	5.8
Interparietal	10.0	9.7	10.9	—	10.5	10.3	—	10.0
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	12.2	13.6	11.0	12.1	11.0	13.1	11.3	13.0
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	4.1	4.5	4.0	4.1	4.0	4.1	—	4.3
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	19.0	20.1	17.3	19.1	17.6	18.7	—	19.4
Incisive foramina, length	6.0	7.2	5.8	6.0	5.5	6.1	6.2	6.3
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.7	3.7	3.1	3.3	2.8	3.2	—	3.1
Length bulla	—	—	4.9	—	4.9	5.2	—	5.0
Crowns m ¹⁻³	6.4	6.7	6.9	6.9	6.6	7.0	6.5	7.0
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	3.0	3.2	3.9	3.4	3.5	3.6	—	3.4
m ¹ , breadth	1.8	1.9	2.0	2.0	1.8	2.0	—	1.9
m ² , length	2.1	2.0	2.1	2.1	1.9	2.1	—	2.0
m ² , breadth	1.8	1.9	2.0	1.9	1.8	2.0	—	1.9
m ³ , length	1.2	1.3	1.3	1.4	1.1	1.4	—	1.2
m ³ , breadth	1.3	1.5	1.6	1.4	1.3	1.5	—	1.4

<i>Melomys cervinipes-moncktoni</i> Group	<i>Melomys c. limicauda</i> , type Sydney, No. M.5928, old ♂	<i>Melomys c. melicus</i> , type B.M. No. 13.6.28.32, ad. ♀	<i>Melomys c. albiventer</i> , type U.S.N.M. No. 237782, ad. ♂	<i>Melomys rubicola</i> , type B.M. No. 46.8.26.7, ad. ♂	<i>Melomys moncktoni</i> , type B.M. No. 4.8.3.4, ad. ♂	<i>Melomys m. intermedius</i> , type B.M. No. 13.6.18.42, ad. ♂	<i>Melomys m. shawi</i> , type A.M.N.H. No. 101959, ad. ♂	<i>Melomys obiensis</i> , type B.M. No. 3.4.10.1, ad. ♀
Head and body	155	122	136	150	160	131	110	135
Tail	165	149	165	170	125	115	109	150
Hind foot (s.u.)	31.5	28	—	30	30	28	27	29
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	19	12	—	11	12	10	18	9.5
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	38	30.8	30.7	37.4	—	31.9	30	—
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	20.5	17.3	17.0	18.1	18.0	17.5	16.4	—
Interorbital breadth	6.3	5.0	5.0	5.4	6.2	6.2	5.7	5.5
Interparietal	11.5	9.7	—	9.4	10.7	9.8	8.8	—
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	13.7	10.7	11.0	12.1	12.8	11.4	11.5	11.0
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	4.6	4.1	—	4.0	4.4	4.5	3.7	3.5
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	20.2	16.5	—	19.2	19.1	18.2	17.2	—
Incisive foramina, length	6.6	5.1	5.1	6.4	4.8	4.2	4.4	5.5
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.9	3.4	—	3.3	3.4	3.5	3.1	—
Length bulla	5.4	4.9	4.6	4.9	—	4.0	3.9	—
Crowns m ¹⁻³	6.4	5.9	5.8	6.5	6.7	6.5	6.4	6.4
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	3.1	3.0	—	3.5	3.5	3.2	3.2	3.2
m ¹ , breadth	2.0	1.7	—	1.9	2.0	2.0	1.9	1.8
m ² , length	2.1	1.8	—	2.0	2.3	2.1	2.1	1.9
m ² , breadth	1.8	1.6	—	1.8	1.9	1.9	1.9	1.8
m ³ , length	1.4	1.1	—	1.3	1.0	1.0	1.0	1.1
m ³ , breadth	1.4	1.2	—	1.4	1.3	1.2	1.3	1.4

<i>Melomys</i> <i>platyops-rubex</i> Group	<i>Melomys p. platyops</i> , type B.M. No. 5.11.28.18, ad. ♂	<i>Melomys p. fuscus</i> , type B.M. No. 22.2.2.38, ad. ♂	<i>Melomys p. mamberanus</i> , type Sody, No. 28, young ♂	<i>Melomys p. arfakiensis</i> , type B.M. No. 29.5.27.28, ad. ♂	<i>Melomys p. jobiensis</i> , type Berlin, No. 45675, ad. ♂	<i>Melomys rubex</i> , type B.M. No. 22.2.2.44, ad. ♂
Head and body	135	160	88	111	115	130
Tail	120	110	82	131	112	135
Hind foot (s.u.)	30	31.5	23.5	29	25	29
Hind foot (c.u.)	—	—	—	—	—	—
Ear	10	12	9	12	—	10
Skull: total length	—	—	—	—	—	—
Condylbasal length	34.3	34.3	—	30.7	—	31.1
Condyl-incisive length	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—
Basal length	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—
Zygomatic breadth	18.2	18.9	13.9	16.7	14.7	17.0
Interorbital breadth	6.1	6.6	5.1	5.8	5.7	5.7
Interparietal	9.4	9.0	—	10.9	—	9.5
Breadth braincase	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—
Nasals, length	12.2	12.8	—	11.6	11.4	11.8
Nasals, greatest breadth	—	—	—	—	—	—
Zygomatic plate	4.4	3.9	3.2	3.8	3.8	3.7
Diastema	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—
Palatal length	19.3	20	14.2	17.6	17.3	17.8
Incisive foramina, length	5.1	5.4	3.5	4.5	4.1	4.8
Incisive foramina, width	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.3	3.7	3.0	3.0	3.1	3.2
Length bulla	4.4	4.2	—	4.2	—	4.1
Crowns m ¹⁻³	6.9	6.4	5.5	6.6	5.7	6.5
Alveoli m ¹⁻³	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—
m ¹ , length	3.5	3.4	3.1	3.3	2.7	3.4
m ¹ , breadth	2.1	2.0	1.6	2.0	1.6	2.0
m ² , length	2.2	2.0	1.6	2.0	1.9	2.0
m ² , breadth	2.0	1.8	1.5	1.9	1.6	1.9
m ³ , length	1.0	1.0	0.6	1.1	0.7	0.8
m ³ , breadth	1.4	1.3	0.9	1.3	1.0	1.3

<i>Melomys platyops-rubex</i> Group	<i>Melomys r. alleni</i> , type M.C.Z. No. 29902, ad. ♀	<i>Melomys r. lafa</i> , type A.M.N.H. No. 104340, ad. ♀	<i>Melomys r. clarus</i> , type B.M. field no. S.M.364, ad. ♂	<i>Melomys r. stresemanni</i> , type Berlin, No. 45671, ad. ♂	<i>Melomys r. pohlei</i> , type Berlin, No. 38938	<i>Melomys r. steini</i> , type Berlin, No. 45674, ad. ♀	<i>Melomys r. rutilus</i> , type B.M. No. 13.6.18.36, ad. ♂
Head and body	108	128	112	130?	110?	124	120
Tail	132	148	132	120	—	128	130
Hind foot (s.u.)	30	30.3	28	28	26	27	28.5
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	10	—	12	—	—	—	13.5
Skull: total length	—	—	—	—	—	—	—
Condylbasal length	31.5	31.8	29.8	30.8	30.5	31.7	32.1
Condyl-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	17	17.1	16.4	16.4	16.2	17.3	17.4
Interorbital breadth	5.6	5.8	5.3	5.2	5.5	5.5	6.0
Interparietal	8.0	7.5	8.8	9.7	9.2	9.2	9.5
Breadth braincase	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—
Nasals, length	12.5	12.0	13.6	12.0	11.1	12.0	11.5
Nasals, greatest breadth	—	—	—	—	—	—	—
Zygomatic plate	4.0	3.8	3.9	3.9	3.9	4.0	3.9
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	18.0	18.0	16.9	17.2	17.7	18.1	18.7
Incisive foramina, length	4.0	4.7	4.3	4.6	4.3	5.3	4.9
Incisive foramina, width	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.6	3.4	3.3	3.0	3.1	3.3	3.3
Length bulla	3.9	4.3	4.0	4.1	3.9	4.6	4.0
Crowns m ¹⁻³	6.1	6.7	6.1	6.3	6.1	6.8	7.0
Alveoli m ¹⁻³	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—
m ¹ , length	3.0	3.3	3.3	3.3	3.0	3.1	3.6
m ¹ , breadth	1.8	1.9	1.8	1.8	1.7	1.9	2.1
m ² , length	1.9	2.2	2.0	1.8	1.9	2.1	2.1
m ² , breadth	1.7	1.9	1.7	1.7	1.6	1.8	2.0
m ³ , length	1.0	1.1	0.9	0.7	1.0	1.1	1.0
m ³ , breadth	1.1	1.3	1.1	1.1	1.1	1.2	1.3

<i>Melomys lutillus</i> Group	<i>Melomys l. lutillus</i> , type B.M. No. 5.11.28.20, ad. ♂	<i>Melomys l. lutillus</i> A.M.N.H. No. 104197, ♂ Mafulu, Papua	<i>Melomys l. muscalis</i> , type B.M. No. 86.5.16.4, ad. ♂	<i>Melomys l. muscalis</i> A.M.N.H. No. 104860, ♂ Daru, mouth Fly River	<i>Melomys l. froggatti</i> , type Sydney, No. M.2377, ad. ♂	<i>Melomys l. murinus</i> , type B.M. No. 99.9.10.3, ad. ♀	<i>Melomys l. australis</i> , type B.M. No. 15.3.5.51, ad. ♀	<i>Melomys l. australis</i> A.M.N.H. No. 154164, ♀ Mt. Tozer, Cape York Peninsula
Head and body	± 105	125	95	114	115	97	109	114
Tail	± 115	106+	105	118	120	108	109	130
Hind foot (s.u.)	24	23.5	23	24	25	23.5	22.5	25
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	8.5	7.3	6.0	—	12	8.0	8.0	14
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	—	27.4	26.2	27.9	—	27.0	26.5	27.5
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	14.7	14.6	14.2	15.0	15.7	14.8	14.0	14.9
Interorbital breadth	4.6	4.5	4.2	4.6	4.4	4.8	4.3	4.4
Interparietal	—	8.0	8.4	7.9	—	9.0	7.7	8.7
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	9.8	10.1	9.7	10.3	10.3	10.0	10.0	10.3
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	2.9	3.1	3.4	3.2	—	3.5	2.9	3.4
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	14.5	14.7	14.1	14.9	—	14.6	14.5	14.5
Incisive foramina, length	4.7	4.8	4.9	4.8	4.6	4.7	4.8	4.5
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.3	2.6	2.8	2.7	—	2.6	2.5	2.8
Length bulla	—	4.3	4.6	4.3	—	4.5	4.4	4.5
Crowns m ¹⁻³	5.3	5.2	4.7	5.3	5.1	5.3	5.2	5.0
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	2.7	2.7	2.4	2.7	—	2.8	2.8	2.6
m ¹ , breadth	1.6	1.7	1.4	1.5	—	1.5	1.5	1.5
m ² , length	1.7	1.6	1.4	1.7	—	1.5	1.5	1.7
m ² , breadth	1.7	1.7	1.3	1.6	—	1.5	1.4	1.5
m ³ , length	0.9	1.0	0.8	1.0	—	0.8	0.9	1.0
m ³ , breadth	1.2	1.2	1.0	1.1	—	1.0	1.1	1.1

<i>Melomys rufescens</i> Group	<i>Melomys musanora</i> , cotype Sydney, No. M.2367, ad. ♂	<i>Melomys r. bougainville</i> , type Sydney, No. M.5757, ad. ♂	<i>Melomys r. stalkeri</i> , type B.M. No. 4.6.7.11, ad. ♀	<i>Melomys r. gracilis</i> , type B.M. No. 5.11.28.15, ad. ♀	<i>Melomys r. dollmani</i> , type B.M. field no. S.M.343, ad. ♂	<i>Melomys r. sexplicatus</i> , type Leiden, Cat. A., ad. ♀	<i>Melomys r. hageni</i> , type Sydney, No. M.6113, ad. ♂	<i>Melomys r. caldieri</i> , type B.M. No. 11.11.11.36, ad. ♂
Head and body	175?	149	135	140	134	150?	124	153?
Tail	105?	140	137	180	190	135	154	155
Hind foot (s.u.)	28	27.5	27	27	29.5	24	26.5	28
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	9	14.3	10	12	10.5	—	14	10
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	—	35	31.8	31.7	31.0	32.8	—	32.9
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	19.2	19.9	17.1	16.9	15.5	17.7	16.1	17.4
Interorbital breadth	6.3	6.8	6.0	5.2	5.6	5.5	5.6	6.2
Interparietal	10	11.7	9.8	9.3	9.2	9.6	—	10
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	13	12.4	10	9.6	10	11	10.9	10.5
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	4.4	4.3	3.6	3.7	3.1	3.6	—	3.9
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	19	17.8	17.4	16.8	15.9	18	—	18.1
Incisive foramina, length	4.6	4.5	4.8	4.4	4.0	3.6	4.2	4.4
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.7	3.7	3.3	3.6	2.7	3.1	—	3.2
Length bulla	—	4.4	4.4	—	4.2	4.8	—	4.5
Crowns m ¹⁻³	6.4	6.2	6.0	6.4	6.0	5.9	5.9	6.3
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	3.6	3.4	3.0	3.3	3.1	3.0	—	3.2
m ¹ , breadth	2.1	1.8	1.9	1.9	1.9	1.7	1.9	1.9
m ² , length	2.0	1.9	2.0	1.9	1.8	2.0	—	2.0
m ² , breadth	1.9	1.8	1.8	1.8	1.8	1.7	—	1.8
m ³ , length	1.0	1.2	1.0	1.0	1.0	1.0	—	1.1
m ³ , breadth	1.2	1.3	1.2	1.2	1.3	1.3	—	1.3

<i>Melomys leucogaster</i> Group	<i>Melomys l. leucogaster</i> , type Leiden, field no. 119, ad. ♀	<i>Melomys l. leucogaster</i> A.M.N.H. No. 105723, ♂ upper Fly River	<i>Melomys l. latipes</i> , type A.M.N.H. No. 104273, young ad. ♂	<i>Melomys l. latipes</i> A.M.N.H. No. 108178, ad. ♂	<i>Melomys arcium</i> , type B.M. No. 89.6.3.2., ad. ♀	<i>Melomys fulgens</i> , type B.M. No. 20.7.26.20, ad. ♂	<i>Melomys caurinus</i> , type B.M. No. 21.2.9.2, ad. ♀	<i>Melomys talaidium</i> , type B.M. No. 21.2.9.3, ad. ♀
Head and body	155	170	142	161	138	150	170?	150?
Tail	115+	+190	147	166	127	200	140	—
Hind foot (s.u.)	34	35	31	32	28	34	29.5	30.5
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	9	—	—	—	—	13	10.5	—
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	38.8	39.1	32.1	36.8	37.7	37.3	—	37.8
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	21.5	21.2	17.5	20.0	20.7	22.2	20.0	20.9
Interorbital breadth	6.7	6.7	5.6	6.3	6.9	7.0	6.4	6.0
Interparietal	11.5	10.0	9.6	9.4	8.9	11.0	10.0	10.5
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	13.8	14.0	—	13.2	13.7	12.9	—	13.2
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	4.8	4.8	4.0	4.7	4.9	4.7	4.3	4.9
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	21.2	21.2	17.7	20.3	21.0	19.5	20.3	21.0
Incisive foramina, length	5.2	5.6	4.9+	5.5	5.8	5.4	5.3	6.2
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pter. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.8	3.5	2.9	3.1	3.5	3.8	3.5	3.9
Length bulla	5.2	4.9	4.4	5.0	4.7	5.1	4.8	4.5
Crowns m ¹⁻³	7.1	7.8	7.1	7.0	7.2	7.1	7.8	7.6
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	3.2	4.0	3.4	3.7	3.6	3.4	4.0	3.7
m ¹ , breadth	2.0	2.2	2.0	2.1	2.0	2.0	2.4	2.2
m ² , length	2.3	2.5	2.1	2.2	2.2	2.1	2.4	2.5
m ² , breadth	2.1	2.2	2.1	2.1	1.9	1.9	2.5	2.3
m ³ , length	1.5	1.5	1.5	1.3	1.3	1.3	1.3	1.3
m ³ , breadth	1.6	1.7	1.6	1.5	1.5	1.5	1.7	1.7

<i>Uromys caudimaculatus</i> Group	<i>Uromys macropus</i> , type B.M. No. 66.4.23.6, ad. ♀	<i>Uromys c. caudimaculatus</i> , type Sydney, No. S.1848, skull only	<i>Uromys c. caudimaculatus</i> A.M.N.H. No. 154332, ♂ Cap York tip (Lockerbie)	<i>Uromys c. caudimaculatus</i> A.M.N.H. No. 108955, ♀ Cape York tip (Somerset)	<i>Uromys c. caudimaculatus</i> A.M.N.H. No. 108952, ♂ Rocky Scrub (Coen area)	<i>Uromys c. sherrini</i> , type B.M. No. 22.12.18.9, ad. ♀	<i>Uromys c. sherrini</i> M.C.Z. No. 29220, ♂ Lake Barrine	<i>Uromys exilis</i> , type Australian Mus. No. M.4378, ad. ♀ (from Troughton)
Head and body	260	373 ^a	317	280	336	286	286	276
Tail	260	338 ^a	368	370	370	344	338	314
Hind foot (s.u.)	59	63.5 ^a	68	60	67	56	67	60
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	20	25.4 ^a	33	—	33	18	29	30
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	—	66.7	70.0	61.8	70.2	65.1	64.6	68.5
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	34.7	36.8	36.8	33.0	35.9	33.6	33.7	36.3
Interorbital breadth	11.8	11.7	12.0	12.5	13.1	10.1	10.7	11.6
Interparietal	12.1	—	13.5	12.6	13.5	13.0	14.1	—
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	22.0	23.0	21.0	22.7	20.0	22.2	—
Nasals, length	26.0	25.1	26.3	25.0	27.1	22.6	24.2	26.4
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	10.0	9.9	10.5	9.2	10.5	9.1	9.2	—
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	39.5	40.2	42.4	37.8	43.3	38.2	39.5	—
Incisive foramina, length	8.0	7.7	7.7	8.3	9.8	8.1	8.0	8.5
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	5.8	6.0	6.3	5.9	6.6	6.0	5.3	—
Length bulla	—	5.8	6.3	6.2	6.5	6.1	6.4	—
Crowns m ¹⁻³	12.2	12.5	12.8	12.1	12.3	11.4	11.9	12.0
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	6.0	6.0	6.3	6.0	6.0	5.5	6.1	—
m ¹ , breadth	3.4	3.5	3.6	3.3	3.4	3.3	3.4	—
m ² , length	3.6	3.9	4.0	3.9	4.0	3.0	3.5	—
m ² , breadth	3.4	3.5	3.5	3.4	3.5	3.2	3.3	—
m ³ , length	2.4	2.8	2.7	2.4	2.8	2.7	2.3	—
m ³ , breadth	2.8	2.9	2.7	2.7	2.5	2.6	2.5	—

^a From Krefft.

<i>Uromys caudimaculatus</i> Group	<i>Uromys c. aruensis</i> , cotype B.M. No. 72.3.5.3, ♂	<i>Uromys c. aruensis</i> , cotype B.M. No. 72.3.5.2, ♀	<i>Uromys c. validus</i> , type Genoa, No. C.E.3248, juv. ♂	<i>Uromys c. nero</i> , type B.M. No. 13.6.18.13, ad. ♀	<i>Uromys c. scaphax</i> , type B.M. No. 13.6.18.8, ad. ♀	<i>Uromys c. proluxus</i> , type B.M. No. 97.8.7.67, ad. ♂	<i>Uromys c. ductor</i> , type B.M. No. 3.12.1.4, ad. ♂	<i>Uromys c. siebersi</i> , type B.M. No. 23.4.3.12, ad. ♂
Head and body	250	260	190	279	277	250	310	280
Tail	310	270	195	232	235	275	280	234
Hind foot (s.u.)	61	56	49	56	52	60	57	53
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	20	16	20	18	17.5	17.0	17.0	18.0
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	—	—	—	63.8	57.5	62.3	61.2	58.6
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	31.6	29.3	—	36.0	31.8	31.6	31.4	32.4
Interorbital breadth	11.5	10.5	—	11.0	11.5	9.6	9.0	10.0
Interparietal	13.0	13.2	—	14.2	13.0	14.2	12.6	10.5
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	—	—	20.8	19.4	20.2	19.5	19.1
Nasals, length	22.2	—	—	24.0	21.5	23.2	23.5	22.0
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	8.4	8.2	—	9.6	8.5	9.1	9.0	8.7
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	36.3	34.4	—	40.2	35.3	37.3	36.3	35.7
Incisive foramina, length	7.8	—	—	8.0	6.3	7.0	7.1	6.6
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	5.7	4.0	—	6.0	5.9	5.2	5.6	5.2
Length bulla	—	—	—	5.8	5.5	6.2	5.5	5.7
Crowns m ¹⁻³	11.9	11.3	—	12.2	10.8	12.0	11.0	11.5
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	5.7	5.6	—	5.9	5.2	5.9	5.5	5.5
m ¹ , breadth	3.3	3.2	—	3.2	3.0	3.2	3.3	3.2
m ² , length	3.6	3.4	—	3.4	3.6	3.7	3.6	3.5
m ² , breadth	3.3	3.2	—	3.2	2.9	3.3	3.1	3.2
m ³ , length	2.4	2.0	—	2.7	2.1	2.0	2.1	2.4
m ³ , breadth	2.5	2.5	—	2.7	2.2	2.5	2.4	2.6

<i>Uromys caudimaculatus</i> Group and <i>Uromys anak</i> Group	Group and <i>Uromys anak</i> Group							
	<i>Uromys c. multiplicatus</i> , type Leiden (no number), juv. ♂	<i>Uromys c. multiplicatus</i> A.M.N.H. No. 152051, ♂ Idenburg River	<i>Uromys c. multiplicatus</i> A.M.N.H. No. 152053, ♀ Idenburg River	<i>Uromys c. multiplicatus</i> A.M.N.H. No. 152061, young ♀ Idenburg River	<i>Uromys lamington</i> , type Sydney, No. M.4684, ad. ♂ (from Troughton)	<i>Uromys anak</i> , type B.M. No. 7.5.22.2, ad. ♂	<i>Uromys anak</i> A.M.N.H. No. 104155, ♀ Mt. Tafa	<i>Uromys anak</i> A.M.N.H. No. 151456, ♂ Bele River
Head and body	185	296	294	304	250	295	335	334
Tail	165	255	314	293	270	400	373	323
Hind foot (s.u.)	37	62	60	57	58.5	68	73	75
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	20	27	20	24	25.5	16	21	22
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	—	—	62.6	63.4	—	—	67.3	70
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	—	33	33	35	31.5	—	35.3	35
Interorbital breadth	—	9.7	9.3	9.7	10	10.2	9.7	11.9
Interparietal	—	11.4	12.6	12.7	—	—	14.3	15.3
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	21.7	21.3	21.0	—	—	23.5	24.0
Nasals, length	—	—	24	23.0	22.6	27.0	23.8	25.0
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	—	9.0	8.6	10.0	—	9.8	8.0	10.5
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	—	40	37.4	38.3	—	42.6	37.3	42.7
Incisive foramina, length	—	7.7	7.4	7.5	6.4	7.0	6.9	6.8
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-petr. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	—	6.7	6.1	6.2	—	7.0	7.7	7.1
Length bulla	—	5.6	6.0	6.3	5.5	—	6.0	6.0
Crowns m ¹⁻³	—	11.4	11.5	11.5	11.2	14.2	12.7	13.0
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	6.0	5.7	5.6	5.7	—	6.4	6.1	6.5
m ¹ , breadth	3.5	3.3	3.1	3.3	3.2	3.7	3.5	3.7
m ² , length	3.3	3.8	3.5	3.6	—	4.0	4.0	4.1
m ² , breadth	3.4	3.2	3.0	3.1	—	4.0	3.5	3.6
m ³ , length	—	2.4	2.6	2.6	—	2.7	2.5	2.6
m ³ , breadth	—	2.5	2.4	2.5	—	3.0	2.9	2.8

<i>Uromys anak</i> Group and the Solomon Islands <i>Uromys</i>	<i>Uromys rothschildi</i> , type B.M. No. 12.1.31.2, ad. ♀	<i>Uromys neobritanicus</i> , type A.M.N.H. No. 99881, ad. ♂, skull only	<i>Uromys sapientis</i> , type B.M. No. 2.5.1.4, ad. ♂	<i>Uromys salebrosus</i> , type Sydney No. M.5590, ad. ♂	<i>Uromys salebrosus</i> , allotype Sydney, No. M.5789, ad. ♀	<i>Uromys rex</i> , type B.M. No. 88.1.5.34, ad. ♂	<i>Uromys rex</i> Genoa, No. C.E.3459, ♂ Guadalcanar	<i>Uromys imperator</i> , type B.M. No. 88.1.5.33, young ♀
Head and body	350	—	260	229 ^a	—	280	250	260
Tail	360	—	285	213 ^a	—	290	285	245
Hind foot (s.u.)	68	—	50	46 ^a	—	55	52	64
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	14	—	—	18 ^a	—	15	13	17.5
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	—	66.3	51.2	50.1	50.3	57	55.5	64.3
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	34.5	36.8	29	27.9	28.9	32.8	31.5	34.2
Interorbital breadth	11	11.2	8.5	8.9	8.5	9.0	9.1	11
Interparietal	—	7.6	14.6	11.8	13	13	13.6	11.9
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	—	22	19	17.5	—	20	18.5	20
Nasals, length	27	24	18	17	17.7	19.6	20.1	23.9
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	9.0	10.4	6.5	5.7	5.8	7.4	6.5	7.4
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	42.5	40.5	27	26.5	27.3	32.7	31.4	36.5
Incisive foramina, length	6.2	7.0	6.8	6.1	6.4	7.3	6.8	7.2
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	6.7	5.9	3.8	4.2	4.1	4.7	5.0	5.2
Length bulla	—	6.4	6.9	6.2	5.9	5.4	4.8	6.2
Crowns m ¹⁻³	12.6	13.9	11.1	11.0	11.0	11.1	10.4	12.0
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	5.9	6.7	5.3	5.0	5.5	4.8	4.9	5.9
m ¹ , breadth	3.7	3.8	3.0	3.1	3.1	3.2	3.1	3.7
m ² , length	4.0	4.3	3.2	3.6	3.5	3.4	3.1	3.7
m ² , breadth	3.5	3.8	2.9	3.2	3.4	3.2	3.1	3.6
m ³ , length	2.4	3.0	2.2	2.3	2.2	2.7	2.3	2.3
m ³ , breadth	2.7	3.0	2.3	2.6	2.5	2.7	2.5	2.6

^a From Troughton.

Solomon Islands <i>Uromys</i> and <i>Pogonomelomys</i> <i>mayeri-bruijnii</i> Group								
	<i>Uromys porculus</i> , type B.M. No. 89.4.3.8, ad. ♂	<i>Uromys salomonis</i> , type Sydney, No. A.11257, ad. ♂	<i>Uromys poncetii</i> , type Sydney, No. M.5756, ad. ♀	<i>Pogonomelomys mayeri</i> , cotype Tring, field no. 182, ad. ♂	<i>Pogonomelomys mayeri</i> A.M.N.H. No. 101953, ♂	<i>Pogonomelomys mayeri</i> A.M.N.H. No. 101954, ♂	<i>Pogonomelomys bruijnii</i> , type Genoa, No. C.E. 3677, ad. ♀	<i>Pogonomelomys b. brassi</i> , type A.M.N.H. No. 105033, ad. ♂
Head and body	220	223*	330	152	138	142	180	173
Tail	130	216*	340	201	176	190	190	197
Hind foot (s.u.)	43	44.7*	71.5	30	29	29	34	33
Hind foot (c.u.)	—	—	—	—	—	—	—	—
Ear	8	12.7*	23	10.5	15	15	9	—
Skull: total length	—	—	—	—	—	—	—	—
Condylbasal length	49.4	47.4	60.9	36.0	34.5	35.3	—	37.7
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	—	—	—	—	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	25.4	28.0	34.0	19.3	19.6	19.8	23.4	20.4
Interorbital breadth	8.2	8.9	9.9	6.1	6.3	5.8	7.2	6.7
Interparietal	12.8	13.2	16.7	10.7	10.3	10.7	—	11.2
Breadth braincase	—	—	—	—	—	—	—	—
Mastoid breadth	17.0	17.5	23.0	14.0	14.1	13.9	—	15.4
Nasals, length	18.4	—	21.7	12.3	12.4	12.2	16.0	13.6
Nasals, greatest breadth	—	—	—	—	—	—	—	—
Zygomatic plate	3.5	6.1	7.8	3.9	4.3	3.5	5.0	4.3
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	16.8	25.9	33.2	18.5	18.4	17.4	22.6	20.2
Incisive foramina, length	6.0	6.2	7.3	5.7	5.5	5.7	5.1	5.1
Incisive foramina, width	—	—	—	—	—	—	—	—
Breadth meso-pter. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.8	4.6	4.8	3.5	3.6	3.7	3.5	3.6
Length bulla	5.2	5.8	7.1	5.2	5.2	4.9	—	5.8
Crowns m ¹⁻³	6.7	10.0	13.5	6.6	6.8	6.6	8.1	7.1
Alveoli m ¹⁻³	—	—	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—	—	—
m ¹ , length	3.4	5.1	6.3	3.2	3.2	3.2	3.6	3.5
m ¹ , breadth	1.9	3.0	4.0	1.9	1.9	1.8	2.0	1.9
m ² , length	2.0	3.3	4.3	2.1	2.2	2.0	2.5	2.3
m ² , breadth	1.9	2.9	3.9	1.8	1.9	1.7	2.0	1.9
m ³ , length	1.3	2.2	3.0	1.3	1.5	1.5	1.6	1.6
m ³ , breadth	1.3	2.3	3.2	1.5	1.5	1.5	1.9	1.6

*From Ramsay.

Pogonomelomys sevia-
rümmli Group

	<i>Pogonomelomys sevia</i> , type A.M.N.H. No. 79755, ad. ♂	<i>Pogonomelomys s. lateri</i> , type B.M. (S.M. No. 708), ♀ (from Hinton)	<i>Pogonomelomys rümmli</i> , type A.M.N.H. No. 150669, young ad. ♂	<i>Pogonomelomys fraterculus</i> , type B.M. No. 20.7.26.26, ad. ♂
Head and body	124	133	104	115
Tail	140	185	138	155
Hind foot (s.u.)	25	25	25	27
Hind foot (c.u.)	—	—	—	—
Ear	—	19	17	13
Skull: total length	—	—	—	—
Condylbasal length	29.0	31.8	26.4	31.3
Condyl-incisive length	—	—	—	—
Condylbasilar length	—	—	—	—
Occipitonasal length	—	—	—	—
Basal length	—	—	—	—
Basilar length	—	—	—	—
Zygomatic breadth	15.4	17.8	16.2	16.2
Interorbital breadth	5.3	4.8	4.3	4.6
Interparietal	10.1	—	10.4	10
Breadth braincase	14.7	—	14.1	—
Mastoid breadth	—	—	12.4	12
Nasals, length	9.9	11.2	10.6	11.8
Nasals, greatest breadth	3.5	—	2.9	—
Zygomatic plate	3.3	—	2.7	3.5
Diastema	—	—	—	—
Height muzzle behind inc.	—	—	—	—
Palatilar length	—	—	—	—
Palatal length	15.2	16.1	13.9	16.9
Incisive foramina, length	5.4	5.8	5.0	6.0
Incisive foramina, width	2.3	—	2.1	—
Breadth meso-pt. fossa	—	—	—	—
Width inside m ¹ -m ¹	3.0	—	3.0	2.8
Length bulla	4.8	4.6	4.2	5.2
Crowns m ¹⁻³	5.8	6.0	4.4	6.7
Alveoli m ¹⁻³	—	—	—	—
Crowns m ¹⁻²	—	—	—	—
m ¹ , length	2.9	—	2.1	3.4
m ¹ , breadth	1.7	1.7	1.4	1.9
m ² , length	1.9	—	1.4	2.0
m ² , breadth	1.6	—	1.3	1.8
m ³ , length	1.1	—	1.1	1.2
m ³ , breadth	1.3	—	1.1	1.3

<i>Rattus exulans</i> Group	<i>Rattus exulans</i> , subsp. B.M. No. 91.10.9.1, old ♂ Collier Bay, n. W. Australia	<i>Rattus exulans aialope</i> , type Sydney, No. M.3721, ad. ♀ (from Troughton)	<i>Rattus exulans gawae</i> , type Sydney, No. N.6370, ♀ (from Troughton)	<i>Rattus exulans lassacqueri</i> , type Sody, No. 51, ad. ♀	<i>Rattus exulans manouquarius</i> , type Sody, No. 57, ad. ♂	<i>Rattus exulans praecelsus</i> , type Sydney, No. M.6110, ad. ♂ (from Troughton)
Head and body	120	119	109	107	114	122
Tail	140	134	116	121	110	128
Hind foot (s.u.)	28(dry)	25.5	—	25.5	24.0	25.2
Hind foot (c.u.)	30(dry)	—	25.5	27.5	25.5	—
Ear	—	—	—	—	—	—
Skull: total length	—	32.6	30.3	—	—	31.4
Condylbasal length	31.6	—	—	30.1	29.3	—
Condyl-incisive length	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—
Basal length	29.5	27.5	—	27.9	27.1	26.9
Basilar length	—	—	—	—	—	—
Zygomatic breadth	16.3	15.8	14.5	15.6	15.0	14.5
Interorbital breadth	5.3	4.9	4.8	5.3	5.0	4.9
Interparietal	10	—	—	10.1	9.5	—
Breadth braincase	14.4	13.8	—	13.6	13.1	12.8
Mastoid breadth	—	—	—	—	—	—
Nasals, length	12.7	12.5	10.5	11.3	11.0	11.7
Nasals, greatest breadth	3.9	—	—	3.5	3.5	—
Zygomatic plate	3.5	—	—	3.3	3.1	—
Diastema	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—
Palatal length	17.5	16.7	15.8	17.0	16.5	16.0
Incisive foramina, length	6.2	6.1	5.3	5.6	5.2	5.5
Incisive foramina, width	2.4	2.3	1.9	2.1	1.9	2.2
Breadth meso-pt. fossa	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.8	—	—	3.3	3.2	—
Length bulla	6.6	5.7	—	6.0	5.6	5.6
Crowns m ¹⁻³	5.0	5.1	5.3	5.3	4.8	5.1
Alveoli m ¹⁻³	—	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—	—
m ¹ , length	2.7	—	—	2.6	2.4	—
m ¹ , breadth	1.5	—	—	1.7	1.5	1.5
m ² , length	1.1	—	—	1.5	1.4	—
m ² , breadth	1.2	—	—	1.6	1.4	—
m ³ , length	1.2	—	—	1.0	1.0	—
m ³ , breadth	1.2	—	—	1.3	1.1	—

<i>Rattus exulans</i> Group	<i>Rattus exulans suffectus</i> , type Sydney, No. M.4156, ad. ♂ (from Troughton)	<i>Rattus exulans libicen</i> , type Sydney, No. M.2483, ad. ♂ (from Troughton)	<i>Rattus exulans browni</i> , cotype B.M. No. 77.7.18.26, ad. ♀	<i>Rattus glauerti</i> , type B.M. No. 26.7.12.2, ad. ?	<i>Rattus rennelli</i> , type Sydney, No. M.4213, ad. ♂ (from Troughton)
Head and body	124.5	106	130	105	149
Tail	124.5	114	110	100	159
Hind foot (s.u.)	25	23.4	25	25(dry)	30.5
Hind foot (c.u.)	—	—	26	27	18
Ear	—	—	—	—	—
Skull: total length	31.9	32	—	—	35.8
Condylbasal length	—	—	—	30.1	—
Condyl-incisive length	—	—	—	—	—
Condylbasilar length	—	—	—	—	—
Occipitonasal length	—	—	—	—	—
Basal length	—	—	—	27.9	—
Basilar length	—	—	—	—	—
Zygomatic breadth	15.6	16	15.2	16.2	17.2
Interorbital breadth	4.7	5.0	5.3	5.0	5.5
Interparietal	—	—	9.1	10.5	—
Breadth braincase	13.6	13.6	13.2	15.0	—
Mastoid breadth	—	—	—	—	—
Nasals, length	11.4	—	11.0	11.1	13.6
Nasals, greatest breadth	—	—	3.2	3.3	—
Zygomatic plate	—	—	3.9	3.1	—
Diastema	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—
Palatilar length	—	—	—	—	—
Palatal length	16.4	15.5	16.5	16.0	19.1
Incisive foramina, length	6.1	6.0	5.5	5.8	6.9
Incisive foramina, width	2.2	2.5	2.0	1.8	2.8
Breadth meso-pt. fossa	—	—	—	—	—
Width inside m ¹ -m ¹	—	—	2.9	3.1	—
Length bulla	—	—	5.7	5.5	—
Crowns m ¹⁻³	4.8	5.0	5.2	5.2	5.5
Alveoli m ¹⁻³	—	—	—	—	—
Crowns m ¹⁻²	—	—	—	—	—
m ¹ , length	—	—	2.6	2.6	—
m ¹ , breadth	—	—	1.6	1.6	—
m ² , length	—	—	1.5	1.6	—
m ² , breadth	—	—	1.5	1.5	—
m ³ , length	—	—	1.0	1.1	—
m ³ , breadth	—	—	1.2	1.2	—

<i>Rattus assimilis</i> Group	<i>Rattus assimilis assimilis</i> , cotype B.M. No. 58.11.24.9, young ad. ♂ Clarence River	<i>Rattus a. assimilis</i> , cotype B.M. No. 58.11.24.10, ♂ Richmond River	<i>Rattus a. assimilis</i> A.M.N.H. No. 65874, ad. ♂ Moseley's Ranch, n. N.S.W.	<i>Rattus a. assimilis</i> A.M.N.H. No. 65860, ad. ♂ Moseley's Ranch, n. N.S.W.	<i>Rattus a. coraci</i> , type B.M. No. 22.12.18.28, ad. ♀	<i>Rattus a. coraci</i> , A.M.N.H. No. 65881, ad. ♂ Atherton Tableland, N. Q.	<i>Rattus a. coraci</i> A.M.N.H. No. 65930, ad. ♀ Atherton Tableland, N. Q.	<i>Rattus a. manicatus</i> , type B.M. No. 58.11.24.7, young ad. ♀
Head and body	175	190	156	175	175	170	165	160
Tail	140	160	165	160	168	172	150	135
Hind foot (s.u.)	36	34	—	—	36	—	—	35
Hind foot (c.u.)	38	36	35	35	38	34	35	37
Ear	16	16	—	—	15	—	—	13
Skull: total length	—	—	38	41	42.3	43.5	41.5	39.6
Condylbasal length	—	—	37	39.2	40.7	40.5	38.9	—
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	—	34.4	36.8	38	37.9	36.2	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	18	21	20.2	20.1	19.4	20	20.1	18.8
Interorbital breadth	5.6	5.5	6.0	5.2	5.6	6.0	5.7	5.5
Interparietal	8.8	11.5	11.0	10.6	9.5	10.1	9.7	9.8
Breadth braincase	15.3	17.1	16.9	15.7	16.2	16.8	16.2	15.8
Mastoid breadth	—	15±	15.9	15.8	14.1	15.5	15.3	13.8
Nasals, length	15.5	16.5	—	16.4	16.3	16.5	16.2	15.4
Nasals, greatest breadth	4.7	4.8	4.5	4.7	4.4	5.0	4.6	4.5
Zygomatic plate	4.5	4.6	4.3	4.6	4.0	4.5	3.9	4.0
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	21.7	23	21	22.7	23.3	24.0	21.8	21
Incisive foramina, length	7.4	8.4	7.1	7.4	8.5	8.5	8.0	7.7
Incisive foramina, width	2.1	2.4	2.1	2.4	2.8	2.8	2.9	2.4
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.6	4.3	3.8	4.2	4.7	4.7	4.5	3.8
Length bulla	—	7.0	6.8	6.8	6.2	7.0	6.6	6.5
Crowns m ¹⁻³	7.2	7.4	7.3	7.4	6.5	7.3	6.7	7.3
Alveoli m ¹⁻³	7.5	7.9	—	7.8	7.0	7.7	7.5	—
Crowns m ¹⁻²	5.6	5.6	5.8	5.8	5.0	5.6	5.1	5.8
m ¹ , length	3.8	3.4	3.2	3.6	3.2	3.4	3.2	3.9
m ¹ , breadth	2.3	2.2	2.2	2.2	2.0	2.2	2.0	2.0
m ² , length	2.0	2.0	2.0	2.1	1.7	2.0	1.9	1.9
m ² , breadth	2.2	2.3	2.2	2.2	1.8	2.2	2.0	1.9
m ³ , length	1.3	1.7	1.6	1.6	1.5	1.7	1.7	1.4
m ³ , breadth	1.8	1.8	1.8	1.8	1.4	1.7	1.6	1.6

<i>Rattus greyi</i> Group	<i>Rattus greyi</i> , cotype B.M. No. 41.1264, ad.	<i>Rattus greyi</i> , cotype B.M. No. 41.1266, ad. ♂	<i>Rattus greyi</i> U.S.N.M. No. 236729, ad. ♂ Port Lincoln	<i>Rattus greyi</i> U.S.N.M. No. 236731, ♂ Port Lincoln	<i>Rattus greyi murrayi</i> , type B.M. No. 23.3.28.6, ad. ♂	<i>Rattus greyi austrinus</i> , type B.M. No. 55.12.24.336, ad. ♂	<i>Rattus greyi peccatus</i> , type Melbourne, No. C.688, young ♀
Head and body	120	130	132	136	134	145	148
Tail	125	130	145	154	116	125	148
Hind foot (s.u.)	29	28	—	—	27.5	27	29
Hind foot (c.u.)	31	30	33	33	29.5	29	—
Ear	12.5	11.5	—	—	13	—	21.5
Skull: total length	—	—	35.9	36.3	36.5	—	36.5
Condylbasal length	—	—	33.7	34.2	34.3	—	34.4
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	30.7	31.8	—	—	—
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	—	16.3	17.0	17.2	18.5	17.8	18.8
Interorbital breadth	5.0	4.9	5.2	5.8	5.2	4.5	5.2
Interparietal	—	—	9.7	10.4	9.5	—	—
Breadth braincase	—	15.4	15.3	16.2	15.4	14.5	—
Mastoid breadth	—	—	12.6	13.8	13.3	—	—
Nasals, length	13.1	12.6	13.0	13.1	14.4	—	14.0
Nasals, greatest breadth	4.1	3.4	3.9	3.8	3.6	—	3.8
Zygomatic plate	4.1	3.5	4.0	3.6	3.3	4.1	—
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	18.4	—	18.4	18.7	19.0	19.7	19.0
Incisive foramina, length	7.4	6.2	6.7	7.1	7.3	7.3	7.3
Incisive foramina, width	2.2	2.0	2.0	2.3	2.5	1.8	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.7	3.5	3.4	3.8	3.5	2.9	3.7
Length bulla	—	5.9	6.3	6.2	6.4	7.6	6.2
Crowns m ¹⁻³	6.0	6.1	6.3	5.9	5.4	7.1	6.4
Alveoli m ¹⁻³	6.6	6.4	6.5	6.1	5.6	—	6.6
Crowns m ¹⁻²	4.5	4.8	5.1	4.8	4.0	5.4	5.0
m ¹ , length	2.75	3.1	3.2	3.0	2.6	3.5	3.4
m ¹ , breadth	1.8	2.0	2.0	1.9	1.8	2.3	2.1
m ² , length	1.7	1.6	1.9	1.8	1.5	2.0	2.1
m ² , breadth	1.8	1.9	1.9	1.9	1.7	2.1	2.0
m ³ , length	1.3	1.25	1.4	1.3	1.3	1.5	1.4
m ³ , breadth	1.4	1.4	1.5	1.5	1.3	1.7	1.6

<i>Rattus ruber</i> Group	<i>Rattus ruber ruber</i> , type Leiden, Jentink, Cat. A young ad. ♀	<i>Rattus ruber jobiensis</i> , type Berlin, No. 45677, old ♂	<i>Rattus ruber sansapor</i> , type Sydney, No. M.7195, ad. ♂ (from Troughton)	<i>Rattus ruber sansapor</i> A.M.N.H. No. 143869, young ad. ♀	<i>Rattus ruber sansapor</i> A.M.N.H. No. 143849, ad. ♀	<i>Rattus ruber biakensis</i> , type Sydney, No. M.7082, old ♀ (from Troughton)	<i>Rattus ruber coenorum</i> , type B.M. No. 22.2.2.19, young ad. ♂	<i>Rattus ruber bandiculus</i> , type B.M. No. 22.2.2.22, old ♂
Head and body	180	230	232	144	224	252	207	252
Tail	150	227	198	134	205	224	230	220
Hind foot (s.u.)	35	38	45	36	—	45	45	48
Hind foot (c.u.)	38.5	—	—	38	47	—	47.5	52
Ear	12	13	—	20.5	23	—	14	14
Skull: total length	46.7	51	54	—	51	53.3	46.6	55.3
Condylbasal length	44	49	—	—	47	—	44.7	53.7
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	41.1	45.8	—	—	45	—	41.2	50.9
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	—	24.1	27.3	—	23.2	23.5	22	27.2
Interorbital breadth	6.8	7.0	7.5	6.1	7.2	7.4	6.6	7.2
Interparietal	11.5	9.8	—	—	11	—	10.3	12.9
Breadth braincase	16.5	17.5	—	—	17.5	—	17.5	18
Mastoid breadth	—	16	—	—	16.5	—	15.7	17.6
Nasals, length	18.1	20.7	22	14	18.8	21.1	16	20
Nasals, greatest breadth	5.7	6.1	7.0	4.4	6.8	5.7	5.2	6.9
Zygomatic plate	4.6	4.5	—	4.0	5.5	—	4.6	6.3
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	26.5	28	30.1	21	27.5	29.3	25.3	31.5
Incisive foramina, length	8.7	9.1	9.3	6.8	8.3	10.2	8.4	10.3
Incisive foramina, width	3.0	3.7	3.8	—	4.0	4.5	3.4	4.9
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	5.2	4.8	—	3.7	5.5	—	5.0	6.0
Length bulla	6.9	7.0	7.4	—	7.0	—	6.6	7.0
Crowns m ¹⁻³	6.1	8.2	8.3	7.6	7.3	7.9	8.0	8.9
Alveoli m ¹⁻³	7.3	8.5	—	—	—	—	8.4	9.2
Crowns m ¹⁻²	4.9	6.2	—	—	—	—	6.5	6.6
m ¹ , length	2.9	3.8	—	4.0	3.5	—	4.0	4.3
m ¹ , breadth	1.8	2.4	—	2.5	2.5	—	2.4	2.5
m ² , length	1.7	2.2	—	2.1	2.2	—	2.3	2.3
m ² , breadth	1.7	2.3	—	2.3	2.3	—	2.3	2.4
m ³ , length	1.4	1.6	—	1.9	2.0	—	1.6	2.1
m ³ , breadth	1.5	2.0	—	1.9	1.9	—	1.9	2.0

<i>Rattus ruber</i> Group	<i>Rattus ruber steini</i> , type Berlin, No. 45676, ad. ♂	<i>Rattus ruber utakawa</i> , type B.M. No. 13.6.18.65, ad. ♂	<i>Rattus ruber tramitius</i> , type B.M. No. 22.2.2.13, ad. ♀	<i>Rattus ruber hageni</i> , type Sydney, No. M.6102, ad. ♂ (from Troughton)	<i>Rattus ruber hageni</i> , allotype Sydney, No. M.6103, ad. ♀ (from Troughton)	<i>Rattus ruber purdieensis</i> , type Sydney, No. M.7183, ad. ♂ (from Troughton)	<i>Rattus ruber purdieensis</i> , allotype Sydney, No. M.7184, ad. ♀ (from Troughton)
Head and body	200	186	175	170	157	190	175
Tail	145	174	170	—	129	160	125
Hind foot (s.u.)	37	37	36	32.5	31.5	35	32
Hind foot (c.u.)	—	39.5	38.5	—	—	—	—
Ear	—	11.5	13	18	18	17	18
Skull: total length	44.5	44.2	41.5	40.8	37	42.4	40
Condylobasal length	41.6	41.7	38.9	—	—	—	—
Condyllo-incisive length	—	—	—	—	—	—	—
Condylobasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	39.1	39	36.5	—	—	38.3	36
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	20.7	20.7	19.8	20	19.3	22	21.5
Interorbital breadth	5.7	6.5	6.3	6.1	5.9	7.3	6.3
Interparietal	10.1	9.0	10.3	—	—	—	—
Breadth braincase	16.8	17	16.8	—	—	16.4	16.7
Mastoid breadth	14.8	14.8	14.2	—	—	—	—
Nasals, length	15	16.5	15.4	15.3	13.5	15.8	14.9
Nasals, greatest breadth	4.7	4.5	4.4	—	—	—	—
Zygomatic plate	4.2	4.2	3.6	—	—	—	—
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	24.2	23.9	22.7	—	—	23.5	22.6
Incisive foramina, length	8.9	8.2	7.5	7.2	6.9	7.6	7.4
Incisive foramina, width	3.1	3.6	3.1	2.8	2.9	2.8	2.7
Breadth meso-pter. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	5.0	5.4	4.3	—	—	—	—
Length bulla	6.3	5.9	5.7	5.8	5.9	6.1	5.5
Crowns m ¹⁻³	7.0	7.3	6.9	6.7	6.8	6.3	7.3
Alveoli m ¹⁻³	7.3	7.5	7.2	—	—	—	—
Crowns m ¹⁻²	5.3	5.6	5.6	—	—	—	—
m ¹ , length	3.1	3.7	3.7	—	—	—	—
m ¹ , breadth	2.1	2.3	2.2	2.0	2.1	—	—
m ² , length	2.1	1.9	1.9	—	—	—	—
m ² , breadth	2.0	2.1	2.1	—	—	—	—
m ³ , length	1.3	1.7	1.3	—	—	—	—
m ³ , breadth	1.6	1.7	1.6	—	—	—	—

<i>Rattus ruber</i> Group	<i>Rattus ruber mordax</i> , type B.M. No. 4.8.3.1, old ♀	<i>Rattus ruber mordax</i> ? U.S.N.M. No. 290543, ♀ Dobodura	<i>Rattus ruber mordax</i> ? U.S.N.M. No. 290544, ♀ Dobodura	<i>Rattus ruber mordax</i> A.M.N.H. No. 108319, ♂ Astrolabe Range	<i>Rattus ruber praetor</i> , type B.M. No. 88.1.5.39, ad. ♀	<i>Rattus ruber mediocris</i> , type Sydney, No. M.5761, ad. ♂ (from Troughton)	<i>Rattus ruber rosalia</i> , type B.M. (Shaw Mayer) No. 588 young ♀
Head and body	171	±160	±160	177	160	196	131
Tail	133	±143	±150	155	120	149	116
Hind foot (s.u.)	31.5	35.5	35.5	35	33.5	38.5	28
Hind foot (c.u.)	34	38	37.5	—	36	—	—
Ear	11	13	14	15	13	18.5	18
Skull: total length	—	—	—	42.6	42.9	44.2	—
Condylbasal length	—	—	—	40.7	40.2	—	34.7
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	—	37.8	37.7	39.4	34.4
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	21.4	—	—	21.2	21.5	23	—
Interorbital breadth	6.1	—	6.4	6.3	6.3	6.9	5.8
Interparietal	11	—	—	9.1	10.9	—	—
Breadth braincase	17	—	—	15.9	16.4	—	13.5
Mastoid breadth	—	—	—	—	14.9	—	—
Nasals, length	15.6	—	16.4	15.5	15.9	16.6	11.9
Nasals, greatest breadth	5.0	5.4	5.7	4.7	5.0	5.4	—
Zygomatic plate	4.4	—	4.6	4.8	5.0	—	3.7
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	23.1	—	25.5	23.4	23.3	24.0	19.3
Incisive foramina, length	7.3	9.1	8.2	7.3	8.0	8.1	6.6
Incisive foramina, width	2.8	2.7	3.3	2.7	3.0	3.2	2.2
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	4.9	—	5.0	4.0	5.2	—	—
Length bulla	—	6.7	6.3	6.3	6.4	6.2	5.7
Crowns m ¹⁻³	7.2	7.6	8.2	7.4	7.1	7.7	6.7
Alveoli m ¹⁻³	8.4	—	—	—	7.1	—	—
Crowns m ¹⁻²	5.8	—	—	—	5.3	—	—
m ¹ , length	3.8	3.6	4.3	4.4	3.3	—	—
m ¹ , breadth	2.2	2.3	2.5	2.7	2.2	2.3	2.1
m ² , length	2.0	2.1	2.2	2.5	1.8	—	—
m ² , breadth	2.1	2.2	2.3	2.5	2.1	—	—
m ³ , length	1.6	1.9	1.9	1.9	1.7	—	—
m ³ , breadth	1.6	1.8	1.9	2.0	1.7	—	—

<i>Rattus leucopus</i> Group	<i>Rattus leucopus leucopus</i> , type B.M. No. 67.5.6.4, ad. ♀	<i>Rattus l. leucopus</i> A.M.N.H. No. 153881, ad. ♂ Tip of Cape York	<i>Rattus l. leucopus</i> A.M.N.H. No. 153824, ♀ Tip of Cape York	<i>Rattus l. leucopus</i> A.M.N.H. No. 153782, ♀ Tip of Cape York	<i>Rattus l. doboensis</i> , type young ♂ (from de Beaufort)	<i>Rattus l. doboensis</i> A.M.N.H. No. 104919, ♀ Wuroi, south Papua	<i>Rattus l. doboensis</i> A.M.N.H. No. 105604, ♂ Wassi Kussa, south Papua	<i>Rattus l. doboensis</i> A.M.N.H. No. 105605, ♀ Wassi Kussa, south Papua
Head and body	170	184	172	172	160	185	182	168
Tail	185	185	178	165	146	160	148	162
Hind foot (s.u.)	39	39	37	35	34	35	36	35
Hind foot (c.u.)	43	—	—	—	—	—	—	—
Ear	18	22	22	19	22	—	19	17
Skull: total length	46.5	46.2	45	42.5	—	43.6	42	42
Condylbasal length	44	43	41.8	39.5	—	41.2	40	39
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	41.5	40.5	39	37.2	—	38	37.3	36.7
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	22	21.2	20.3	21.1	—	21.7	20.7	19.6
Interorbital breadth	7.2	6.3	6.4	6.1	—	7.2	6.4	6.2
Interparietal	11.0	10.7	9.8	9.0	—	10.5	11.0	10.9
Breadth braincase	16.6	17.5	16.3	16.6	—	16.2	16.7	16.3
Mastoid breadth	15.0	15.5	14.3	14.4	—	14.2	14.7	14.2
Nasals, length	17.7	17.7	17.8	16.0	13.5	15.6	15.0	16.5
Nasals, greatest breadth	5.2	4.9	4.6	4.5	—	4.7	4.7	4.6
Zygomatic plate	4.6	4.4	4.4	4.0	—	4.4	4.6	4.2
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	25.2	24.8	24.0	22.6	—	23.7	22.9	22.6
Incisive foramina, length	8.0	8.1	8.1	7.8	—	7.5	7.3	7.0
Incisive foramina, width	3.8	3.9	3.4	3.3	—	3.3	3.2	2.9
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	5.1	5.0	4.8	4.9	—	5.1	5.1	4.9
Length bulla	7.7	7.0	7.0	7.0	—	7.2	6.8	6.9
Crowns m ¹⁻³	6.8	7.3	7.1	6.8	7.0	7.0	6.8	6.9
Alveoli m ¹⁻³	7.3	8.0	7.5	7.2	—	7.5	7.6	7.4
Crowns m ¹⁻²	5.3	5.8	5.5	5.3	—	5.4	5.4	5.7
m ¹ , length	3.2	3.6	3.4	3.3	—	3.5	3.5	3.7
m ¹ , breadth	2.0	2.2	2.1	2.2	—	2.2	2.1	2.3
m ² , length	1.9	2.2	2.2	2.0	—	2.0	2.1	2.1
m ² , breadth	1.9	2.0	1.9	2.1	—	2.1	2.0	2.0
m ³ , length	1.5	1.8	1.6	1.6	—	1.7	1.6	1.7
m ³ , breadth	1.5	1.7	1.5	1.7	—	1.8	1.5	1.7

<i>Rattus leucopus</i> Group	<i>Rattus l. ringens</i> , type Genoa, No. C.E. 3460, ad. ♀	<i>Rattus l. ratticolor</i> , type Leiden, field no. 84, young ♀	<i>Rattus l. ringens</i> A.M.N.H. No. 105491, ♂ Sturt Island Camp	<i>Rattus l. ringens</i> A.M.N.H. No. 105476, ♀ Sturt Island Camp	<i>Rattus l. ringens</i> A.M.N.H. No. 105388, ♀ Sturt Island Camp
Head and body	190	145	193	222	189
Tail	165	135	160	—	150
Hind foot (s.u.)	37	37	37	40	36
Hind foot (c.u.)	—	39	—	—	—
Ear	18	—	19	—	—
Skull: total length	46.5	—	46	46	44.1
Condylbasal length	43.7	—	43.3	43.2	41.6
Condyllo-incisive length	—	—	—	—	—
Condylbasilar length	—	—	—	—	—
Occipitonasal length	—	—	—	—	—
Basal length	—	—	40.5	40.7	39.3
Basilar length	—	—	—	—	—
Zygomatic breadth	23	—	22.3	22.2	21.8
Interorbital breadth	7.5	7.1	7.1	6.7	7.0
Interparietal	13.5	11.4	12.3	10.5	11.5
Breadth braincase	17.4	16.3	17.2	17.4	16.8
Mastoid breadth	—	14.1	15.7	15.1	14.8
Nasals, length	17	14.5	17.5	17.6	16.4
Nasals, greatest breadth	5.3	4.2	5.4	5.4	5.1
Zygomatic plate	4.9	—	5.0	4.8	4.5
Diastema	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—
Palatilar length	—	—	—	—	—
Palatal length	—	—	25.2	24.7	23.7
Incisive foramina, length	8.7	—	8.8	8.3	8.0
Incisive foramina, width	2.9	—	4.0	3.1	3.5
Breadth meso-pt. fossa	—	—	—	—	—
Width inside m ¹ -m ¹	4.8	3.5	5.2	5.0	4.7
Length bulla	7.5	6.3	7.2	7.1	7.0
Crowns m ¹⁻³	7.5	7.4	7.3	7.7	7.8
Alveoli m ¹⁻³	—	—	7.6	8.2	8.2
Crowns m ¹⁻²	6.3	5.8	5.7	5.9	6.2
m ¹ , length	3.9	3.6	3.7	3.9	4.1
m ¹ , breadth	2.4	2.4	2.4	2.4	2.4
m ² , length	2.1	2.2	2.0	2.1	2.1
m ² , breadth	2.1	2.2	2.1	2.3	2.2
m ³ , length	1.6	1.6	1.7	1.8	1.9
m ³ , breadth	1.6	1.7	1.6	1.7	1.9

<i>Rattus leucopus</i> Group	<i>Rattus l. doboduræ</i> , type Sydney, No. M.6960, young ♂ (from Troughton)	<i>Rattus l. doboduræ</i> , allotype Sydney, No. M.6987, ad. ♀ (from Troughton)	<i>Rattus l. doboduræ</i> A.M.N.H. No. 108226, ad. ♂ Astrolabe Range	<i>Rattus l. doboduræ</i> A.M.N.H. No. 108259, ad. ♀ Astrolabe Range	<i>Rattus l. owiensis</i> , type Sydney, No. M.6993, young ♂ (from Troughton)	<i>Rattus l. owiensis</i> , allotype Sydney, No. M.6992, ad. ♀ (from Troughton)
Head and body	182	196	186	187	156	170
Tail	173	188	173	158	174	166
Hind foot (s.u.)	40	39	37	38	37	38
Hind foot (c.u.)	—	—	—	—	—	—
Ear	19	20	—	—	20.5	20.3
Skull: total length	44.3	47.9	44.0	42.6	—	45
Condylbasal length	—	—	41.4	41.2	—	—
Condyllo-incisive length	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—
Basal length	38.6	41.5	38.5	38.6	—	—
Basilar length	—	—	—	—	—	—
Zygomatic breadth	20.5	22.3	21.2	20.9	—	21.5
Interorbital breadth	6.8	7.3	7.3	6.7	—	6.8
Interparietal	—	—	10.3	11.6	—	—
Breadth braincase	17	17.1	17.2	—	—	—
Mastoid breadth	—	—	—	—	—	—
Nasals, length	16.6	18.4	16.4	16.7	—	18.2
Nasals, greatest breadth	5.0	5.2	5.4	5.1	—	6.0
Zygomatic plate	—	—	4.5	4.4	—	—
Diastema	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—
Palatal length	23.5	25.6	23	23.8	—	24.4
Incisive foramina, length	7.7	8.7	7.4	7.9	—	8.4
Incisive foramina, width	3.5	3.4	3.4	3.2	—	3.6
Breadth meso-pt. fossa	—	—	—	—	—	—
Width inside m ¹ -m ¹	—	—	5.0	4.8	—	—
Length bulla	6.5	6.9	6.6	6.5	—	—
Crowns m ¹⁻³	7.1	7.1	7.2	6.7	—	7.8
Alveoli m ¹⁻³	—	—	7.4	7.2	—	—
Crowns m ¹⁻²	—	—	5.6	5.3	—	—
m ¹ , length	—	—	3.5	3.3	—	—
m ¹ , breadth	—	—	2.3	2.0	—	2.2
m ² , length	—	—	2.0	2.1	—	—
m ² , breadth	—	—	2.2	2.1	—	—
m ³ , length	—	—	1.7	1.5	—	—
m ³ , breadth	—	—	1.7	1.6	—	—

<i>Rattus leucopus</i> Group	<i>Rattus verecundus</i> , type B.M. No. 3.12.1.1, old ♀	<i>Rattus verecundus</i> Genoa, No. C.E. 3517, ♀	<i>Rattus verecundus</i> A.M.N.H. No. 108996, ♂ Astrolabe Range	<i>Rattus verecundus</i> A.M.N.H. No. 108239, ♂ Kagi, 5000 ft.	<i>Rattus v. mollis</i> , type M.C.Z. No. 29905, ad. ♀	<i>Rattus v. försteri</i> , type Leiden No. 292/2, ad. ♀ (from Rümmler)	<i>Rattus v. unicolor</i> , type Berlin, No. 45678, ad. ♂
Head and body	170?	140	153	155	136	—	160
Tail	165	—	175	178	160	—	155
Hind foot (s.u.)	35	34	35	35	30	—	35
Hind foot (c.u.)	—	—	—	—	—	—	—
Ear	10	12	—	17	9	—	—
Skull: total length	—	39.5	39.8	39	37.8	38	40.3
Condylbasal length	37	37.1	37.7	36	34.5	—	37
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	34.3	34.6	35.2	33.3	32	—	34.6
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	18.5	18.8	18.5	18	17	18.2	18
Interorbital breadth	6.1	6.2	6.1	6.2	6.5	5.7	6.5
Interparietal	9.1	11.1	9.3	9.7	9.0	—	11
Breadth braincase	15.7	15.7	15	15.8	14.8	—	16.1
Mastoid breadth	13.2	13.6	12.6	13.3	12.8	—	14
Nasals, length	15.2	14.8	15.3	15.5	13	14.5	15.3
Nasals, greatest breadth	4.4	4.3	4.6	4.4	3.9	—	3.9
Zygomatic plate	3.6	4.0	3.7	3.4	2.9	—	3.6
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	21.1	21.2	21.5	20.6	19.8	19.8	21.2
Incisive foramina, length	7.1	7.1	7.0	6.9	6.4	6.6	6.4
Incisive foramina, width	3.0	2.9	3.2	3.0	2.8	2.9	2.4
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	4.5	4.7	4.4	4.3	5.0	—	4.4
Length bulla	5.9	5.7	5.8	5.9	5.1	—	5.8
Crowns m ¹⁻³	6.5	6.5	6.2	6.4	6.0	6.3	6.2
Alveoli m ¹⁻³	7.1	6.6	6.6	6.8	—	—	—
Crowns m ¹⁻²	5.1	4.6	5.0	5.1	4.2	—	4.9
m ¹ , length	3.2	2.9	3.2	3.2	3.0	—	3.0
m ¹ , breadth	1.9	1.9	1.9	2.0	1.8	—	1.8
m ² , length	1.8	1.6	1.8	1.9	1.5	—	1.7
m ² , breadth	1.8	1.8	1.8	1.9	1.5	—	1.8
m ³ , length	1.5	1.4	1.4	1.5	1.4	—	1.2
m ³ , breadth	1.4	1.4	1.5	1.4	1.2	—	1.5

<i>Rattus niobe</i> Group	<i>Rattus niobe niobe</i> , type B.M. No. 5.11.28.7, young ad. ♀	<i>Rattus niobe niobe</i> A.M.N.H. No. 104307, ad. ♂ Mt. Tala	<i>Rattus niobe niobe</i> A.M.N.H. No. 104251, ♂ Mt. Albert Edward, 11,000 ft.	<i>Rattus niobe stevensi</i> , type M.C.Z. No. 29915, ad. ♂	<i>Rattus niobe rufulus</i> , type B.M. No. 28.10.1.34, ad. ♀	<i>Rattus niobe arrogans</i> , type B.M. No. 22.2.2.24, ad. ♀
Head and body	120	123	134	105	125?	140?
Tail	140	125	131	124	110	130
Hind foot (s.u.)	27	25	27	25	28	28
Hind foot (c.u.)	—	—	—	—	—	—
Ear	11	18	21	10	10	12
Skull: total length	32.5	31.5	34	33	33.7	34.1
Condylbasal length	30.1	28.6	32	30	30.8	31
Condyllo-incisive length	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—
Basal length	27.8	27.4	29.4	27.5	28.6	28.6
Basilar length	—	—	—	—	—	—
Zygomatic breadth	15.5	15.3	15.9	15	15.6	16.7
Interorbital breadth	5.8	5.7	5.9	5.3	5.9	7.0
Interparietal	9.4	10.2	10.8	8.0	9.0	10.2
Breadth braincase	14.4	14.3	15	14.5	14	15.6
Mastoid breadth	12.5	12.0	12	12	12.1	12.9
Nasals, length	12	11.5	13	13.5	12.2	12.2
Nasals, greatest breadth	3.6	3.7	3.5	3.4	3.4	3.6
Zygomatic plate	2.5	2.2	2.5	1.9	2.5	2.2
Diastema	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—
Palatal length	—	16.3	17.8	16.8	17.3	17.2
Incisive foramina, length	4.7	5.0	5.0	4.8	4.6	5.1
Incisive foramina, width	2.0	2.1	2.0	1.9	2.1	2.0
Breadth meso-pt. fossa	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.6	3.5	3.2	3.8	3.0	3.5
Length bulla	4.9	4.7	5.0	5.0	5.3	5.2
Crowns m ¹⁻³	5.5	5.4	5.6	4.9	5.6	5.7
Alveoli m ¹⁻³	—	5.8	6.0	—	—	—
Crowns m ¹⁻²	4.3	4.3	4.4	4.0	4.4	4.5
m ¹ , length	2.7	2.6	2.7	2.7	2.7	2.8
m ¹ , breadth	1.8	1.8	1.8	1.8	2.0	1.9
m ² , length	1.5	1.6	1.6	1.5	1.5	1.6
m ² , breadth	1.6	1.7	1.7	1.5	1.8	1.8
m ³ , length	1.2	1.2	1.3	0.9	1.1	1.2
m ³ , breadth	1.3	1.4	1.3	1.0	1.3	1.3

<i>Rattus niobe</i> Group	<i>Rattus niobe haymani</i> (= <i>klossi</i>) B.M. No. 13.6.18.83, ad. ♂	<i>Rattus niobe pococki</i> (= <i>clarae</i>) Berlin, No. 45679, ad. ♀	<i>Rattus n. orfkiensis</i> , type B.M. No. 29.5.27.36, ad. ♀	<i>Rattus shawmayeri</i> , type B.M. field no. 636, ♀	<i>Rattus richardsoni</i> , type A.M.N.H. No. 150701, ad. ♂
Head and body	123	127	133	97	161
Tail	130	126	135	159	144
Hind foot (s.u.)	28	25	29	23.5	39
Hind foot (c.u.)	—	—	—	—	—
Ear	12	—	13	16	25
Skull: total length	34.1	33	35.1	—	39.7
Condylbasal length	31.5	30.6	32.2	25.2	37
Condyllo-incisive length	—	—	—	—	—
Condylbasilar length	—	—	—	—	—
Occipitonasal length	—	—	—	—	—
Basal length	29.2	28	29.8	—	34.6
Basilar length	—	—	—	—	—
Zygomatic breadth	15.6	15.9	16.1	—	18
Interorbital breadth	6.0	6.3	6.3	3.8	6.5
Interparietal	10.2	9.0	9.6	—	9.8
Breadth braincase	14.5	14.3	14.7	12.3	16.6
Mastoid breadth	12.2	12.2	12.4	—	13.8
Nasals, length	12.8	11.7	12.5	9.5	15.6
Nasals, greatest breadth	3.5	3.6	3.8	—	4.0
Zygomatic plate	1.9	2.0	2.3	—	3.5
Diastema	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—
Palatilar length	—	—	—	—	—
Palatal length	17.7	16.2	18.1	13.2	20
Incisive foramina, length	5.0	4.5	6.0	4.7	7.0
Incisive foramina, width	2.4	2.2	2.6	—	2.8
Breadth meso-pt. fossa	—	—	—	—	—
Width inside m ¹ -m ¹	3.8	3.1	3.9	—	3.6
Length bulla	5.0	4.6	5.1	3.7	6.2
Crowns m ¹⁻³	5.6	5.2	5.5	4.1	6.3
Alveoli m ¹⁻³	—	—	—	—	6.8
Crowns m ¹⁻²	4.3	4.1	4.2	—	4.9
m ¹ , length	2.7	2.5	2.6	—	2.1
m ¹ , breadth	1.8	2.0	1.8	1.3	1.9
m ² , length	1.5	1.5	1.6	—	1.9
m ² , breadth	1.7	1.7	1.7	—	1.9
m ³ , length	1.2	1.0	1.2	—	1.5
m ³ , breadth	1.2	1.1	1.3	—	1.6

<i>Rattus youngi</i> Group and <i>Rattus lutreolus</i> Group	<i>Rattus youngi youngi</i> , type B.M. No. 26.7.1.1, ad. ♂	<i>Rattus youngi vallesius</i> , type B.M. No. 47.8.14.5, ad. ♂	<i>Rattus lutreolus</i> , cotype B.M. No. 41.1258, ad. ♂	<i>Rattus lutreolus</i> , cotype B.M. No. 41.1259, ad. ♀	<i>Rattus lutreolus</i> B.M. 41.1254, ad. ♂ Adelaide	<i>Rattus l. imbil</i> , type Sydney, No. M.6228, ad. ♂ (from Troughton)	<i>Rattus l. vellerosus</i> , cotype B.M. No. 47.3.1.2, ad. ♂	<i>Rattus l. velutinus</i> , type B.M. No. 77.7.3.1, young ad. ♀
Head and body	165	150	170	170	170	181	175	160
Tail	130	140	125	110	130	111	130	105
Hind foot (s.u.)	28.5	28.5	34	31	32	32.5	34	28.5
Hind foot (c.u.)	31	30.5	38	34.5	36	—	37	31.5
Ear	13	11.5	—	13	13	—	12	11
Skull: total length	38.4	36.3	—	—	—	40.7	—	—
Condylbasal length	36.3	35.3	—	—	—	—	—	—
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	34.1	33.2	—	—	—	37	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	19.9	19.9	—	—	21	22.1	± 22	19.1
Interorbital breadth	5.3	4.8	5.5	5.2	5.5	5.3	5.7	5.4
Interparietal	10	10.5	—	—	—	—	—	—
Breadth braincase	15.4	15.2	—	15.5	15.5	16.6	15.5	15.9
Mastoid breadth	—	—	—	—	—	—	—	—
Nasals, length	14	13.1	14.9	14.7	—	15.5	15.4	13.1
Nasals, greatest breadth	4.5	3.8	4.8	4.8	—	4.9	4.2	3.8
Zygomatic plate	4.3	4.1	5.6	5.4	5.1	—	5.2	3.9
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	20.2	19.5	23.3	21.8	22.4	23.2	23.5	19.7
Incisive foramina, length	8.0	7.3	7.4	6.8	7.2	7.7	7.4	6.7
Incisive foramina, width	2.0	1.7	1.8	1.8	1.9	1.8	2.0	1.8
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.6	3.0	3.7	3.9	3.6	—	3.8	2.5
Length bulla	7.1	8.3	—	—	—	—	—	6.2
Crowns m ¹⁻³	6.5	6.6	8.3	7.6	7.7	7.9	8.0	7.7
Alveoli m ¹⁻³	6.8	6.9	9.1	8.1	8.3	—	8.5	—
Crowns m ¹⁻²	5.0	5.0	6.3	5.8	6.0	—	6.0	6.0
m ¹ , length	3.1	3.1	4.0	3.7	4.1	—	4.0	4.0
m ¹ , breadth	2.1	2.2	2.7	2.4	2.6	2.6	2.6	2.5
m ² , length	1.9	1.8	2.1	2.0	1.9	—	2.1	2.0
m ² , breadth	2.0	2.1	2.6	2.3	2.4	—	2.5	2.4
m ³ , length	1.4	1.5	2.0	1.8	1.8	—	1.8	1.7
m ³ , breadth	1.7	1.7	2.0	1.9	1.9	—	2.1	1.9

<i>Rattus lutreolus</i> Group and <i>Rattus tunneyi-culmorum</i> Group							
	<i>Rattus l. fuscipes</i> , topotype B.M. No. 58.11.24.8	<i>Rattus l. fuscipes</i> , topotype B.M. No. 58.11.24.11	<i>Rattus l. fuscipes</i> B.M. No. 6.8.1.70, ad. ♀ King River, W. Australia	<i>Rattus l. mondrianeus</i> , type B.M. No. 7.7.18.3, ad. ♂	<i>Rattus tunneyi tunneyi</i> , type B.M. No. 4.1.3.30, ad. ♀	<i>Rattus t. tunneyi</i> U.S.N.M. No. 237780, ♀ 100 miles S. of Darwin	<i>Rattus t. tunneyi</i> U.S.N.M. No. 237791, ♂ 100 miles S. of Darwin
Head and body	160	—	150	160	155	149	146
Tail	—	—	135	120	115	125	143
Hind foot (s.u.)	29	—	29	29	30	—	—
Hind foot (c.u.)	31	—	31	31.5	32	30	33
Ear	12	—	11	14	14	—	—
Skull: total length	—	—	37.2	—	36.5	35	37.3
Condylbasal length	—	—	35.3	35.1	35.5	34.2	36.7
Condyllo-incisive length	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—
Basal length	—	—	33	32.9	33.2	32.1	34.8
Basilar length	—	—	—	—	—	—	—
Zygomatic breadth	18.5	—	19.3	18.3	20.2	18.9	20.1
Interorbital breadth	5.1	5.2	4.9	5.6	5.3	5.0	5.3
Interparietal	10	—	10.4	10.4	10	9	9.2
Breadth braincase	15.9	—	16.3	15.9	16	15.2	15.4
Mastoid breadth	—	—	—	—	14.3	13.5	13.5
Nasals, length	13.5	14.1	13.5	13.2	12.6	11.5	13
Nasals, greatest breadth	3.7	3.7	3.9	4.0	4.1	3.7	4.1
Zygomatic plate	4.0	3.7	3.8	3.6	4.3	4.3	5.0
Diastema	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—
Palatal length	—	—	19.8	19.6	19.6	19.4	20.7
Incisive foramina, length	6.8	—	7.1	6.8	7.3	7.4	7.9
Incisive foramina, width	1.8	—	1.9	2.0	1.8	1.9	2.0
Breadth meso-pt. fossa	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.1	—	3.5	3.6	3.4	3.1	3.7
Length bulla	—	—	6.5	6.0	9.25	8.7	9.0
Crowns m ¹⁻³	7.1	7.0	7.0	5.9	7.2	7.6	7.1
Alveoli m ¹⁻³	—	—	7.4	6.4	7.5	7.7	7.9
Crowns m ¹⁻²	5.2	5.4	5.3	4.5	5.6	5.9	5.5
m ¹ , length	3.4	3.4	3.4	2.8	3.7	3.9	3.8
m ¹ , breadth	2.2	2.2	2.3	1.9	2.4	2.6	2.3
m ² , length	1.9	2.0	1.9	1.5	2.0	2.2	2.1
m ² , breadth	2.2	2.2	2.2	1.8	2.3	2.4	2.3
m ³ , length	1.5	1.5	1.5	1.3	1.3	1.6	1.5
m ³ , breadth	1.7	1.8	1.8	1.4	1.9	1.9	1.8

Rattus tunneyi-culmorum
Group and *Rattus*
sordidus Group

	<i>Rattus t. woodwardi</i> , type B.M. No. 5.1.9.1, young ad. ♀	<i>Rattus t. woodwardi</i> Perth Mus. No. 4519, ad. ♂	<i>Rattus t. melvilleus</i> , type B.M. No. 13.6.28.33, ad. ♂	<i>Rattus t. dispar</i> , type Melbourne, No. R.12642, young ♂	<i>Rattus t. dispar</i> , paratype Melbourne, No. C.514	<i>Rattus culmorum</i> , type B.M. No. 7.9.15.21, young ad. ♀	<i>Rattus sordidus</i> , cotype B.M. No. 58.11.24.5, ad.	<i>Rattus sordidus</i> , cotype B.M. No. 58.11.24.6, ad.
Head and body	145	—	173	—	131	150	150	150
Tail	120	—	135	—	114	135	110	125
Hind foot (s.u.)	26	31	30	—	27	29.5	33	33
Hind foot (c.u.)	28.5	—	33	—	—	31.5	36	36
Ear	12	—	15	—	16	13	—	—
Skull: total length	—	—	40.4	39.8	35.4	35.8	—	—
Condylbasal length	—	36.2	39.5	31.5	34.4	34.5	—	—
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	34.1	36.8	32	32.3	32	—	—
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	18	19.1	21.4	19.6	19.6	18.5	—	21.2
Interorbital breadth	5.0	4.8	5.8	4.9	5.0	4.8	4.8	5.5
Interparietal	9.0	—	11.0	9.0	9.8	9.4	10.4	9.6
Breadth braincase	14.3	—	16.4	15.4	14.8	15.1	16.6	16
Mastoid breadth	—	—	15	13	14.1	13.9	—	—
Nasals, length	11.3	—	15	11	12.9	12.3	14.4	14
Nasals, greatest breadth	3.0	—	4.8	3.8	3.9	3.7	3.8	4.2
Zygomatic plate	4.0	—	5.2	—	—	4.4	4.6	4.7
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	17.7	20	22.1	17.2	19.2	18.9	—	—
Incisive foramina, length	6.1	7.6	8.6	6.8	7.5	7.3	8.3	8.2
Incisive foramina, width	1.5	—	2.5	—	—	2.1	2.2	1.9
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	2.45	—	3.6	2.4	3.2	3.0	3.0	2.9
Length bulla	±8	8.2	10.2	8.1	9.1	8.8	—	±8
Crowns m ¹⁻³	6.2	6.8	7.5	6.8	7.0	7.0	8.0	8.1
Alveoli m ¹⁻³	6.7	—	8.0	—	—	7.4	8.4	8.8
Crowns m ¹⁻²	4.8	5.2	5.6	—	—	5.4	6.1	6.2
m ¹ , length	3.0	3.3	3.7	3.3	3.2	3.3	4.1	4.2
m ¹ , breadth	2.2	2.2	2.6	2.5	2.4	2.5	2.6	2.6
m ² , length	1.8	1.9	2.0	2.1	1.8	2.0	2.1	2.2
m ² , breadth	2.1	2.2	2.4	2.5	2.4	2.5	2.4	2.6
m ³ , length	1.3	1.4	1.7	1.5	1.7	1.5	1.9	1.7
m ³ , breadth	1.6	1.6	1.9	1.8	1.7	1.8	1.8	1.9

<i>Rattus gestri</i> Group	<i>Rattus gestri gestri</i> , cotype B.M. No. 97.8.7.36, ad. ♀	<i>Rattus gestri gestri</i> , cotype Genoa, No. C.E.3501-48, ad. ♂	<i>Rattus gestri gestri</i> A.M.N.H. No. 104009, ♀ Rona Falls, Moresby	<i>Rattus brachyrhinus</i> , type A.M.N.H. No. 104210, ad. ♂	<i>Rattus g. bunae</i> , type Sydney, No. M.7072, ad. ♂ (from Troughton)	<i>Rattus g. bunae</i> , paratype Sydney, No. M.6989, ad. ♀ (from Troughton)	<i>Rattus g. aramia</i> , type Sydney, No. M.4893, ad. ♂ (from Troughton)	<i>Rattus g. aramia</i> , paratype Sydney, No. M.4895, young ♀ (from Troughton)
Head and body	130	155	150	187	176	155	157	136
Tail	115	120	128	141	140	127	117.5	98.5
Hind foot (s.u.)	29	28	28.7	30	31.5	29	30.5	27
Hind foot (c.u.)	31	—	29.7	33	—	—	—	—
Ear	10	13	19.2	20.7	19.5	19.5	16	—
Skull: total length	36.3	36.3	36.8	38.5	38.5	37.7	38	33.8
Condylbasal length	34.7	35.3	36	38.1	—	—	—	—
Condyllo-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	32.3	33.2	33.3	35.9	37.5	34.5	33.7	30.2
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	17.7	19.2	18.3	19.6	19.9	19.8	19.5	18.1
Interorbital breadth	5.0	5.5	5.4	5.0	5.3	5.2	5.5	5.3
Interparietal	10.7	10.7	8.7	9.5	—	—	—	—
Breadth braincase	14.9	14.9	15.6	15.1	15.2	14.8	15.7	14.3
Mastoid breadth	13.0	13.5	13.5	13.6	—	—	—	—
Nasals, length	13.3	13.5	13.1	13.6	14.0	14.1	13.8	11.7
Nasals, greatest breadth	4.3	4.2	4.2	4.6	4.2	4.3	5.1	4.5
Zygomatic plate	4.0	4.0	4.3	4.3	—	—	—	—
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	19.6	19.9	19.8	20.8	20.8	21.0	—	—
Incisive foramina, length	7.4	7.6	7.6	8.0	8.2	7.6	7.6	7.0
Incisive foramina, width	2.1	2.0	2.0	2.2	2.3	2.0	—	—
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	3.3	3.6	3.6	3.1	—	—	—	—
Length bulla	7.3	7.9	7.1	8.3	7.6	7.6	8.1	6.8
Crowns m ¹⁻³	6.8	6.2	7.0	7.0	7.0	6.9	7.0	6.7
Alveoli m ¹⁻³	7.3	—	7.8	7.5	—	—	—	—
Crowns m ¹⁻²	5.3	4.8	5.5	5.5	—	—	—	—
m ¹ , length	3.2	3.0	3.5	3.3	—	—	—	—
m ¹ , breadth	2.3	2.1	2.4	2.3	—	—	—	—
m ² , length	2.0	1.8	1.9	2.1	—	—	—	—
m ² , breadth	2.1	2.0	2.4	2.2	—	—	—	—
m ³ , length	1.5	1.3	1.6	1.6	—	—	—	—
m ³ , breadth	1.5	1.4	1.7	1.6	—	—	—	—

<i>Rattus gestri-villosissimus</i> Group	<i>Rattus gestri apex</i> , type Sydney, No. M.3371, old ♀ (from Troughton)	<i>Rattus g. apex</i> A.M.N.H. No. 153792, ♀ Lockerbie	<i>Rattus g. apex</i> A.M.N.H. No. 153873, old ♂ Lockerbie	<i>Rattus g. apex</i> A.M.N.H. No. 153926, ♀ Iron Range	<i>Rattus g. conatus</i> , type B.M. No. 23.1.5.15, ad. ♀	<i>Rattus g. conatus</i> A.M.N.H. No. 153992, young ♀ 30 miles S. of Cooktown	<i>Rattus g. conatus</i> A.M.N.H. No. 153734, ad. ♂ Russell River, S. Cairns	<i>Rattus g. colletti</i> , type B.M. No. 4.4.4.4, young ad. ♀
Head and body	159	159	198	163	150	140	175	130
Tail	122	128	162	134	140	123	134	110
Hind foot (s.u.)	29	28	32	27	31	27	31	27.5
Hind foot (c.u.)	—	—	—	—	33	—	—	29.5
Ear	—	16	16	16	—	13	13	—
Skull: total length	38.5	37.6	43.7	38.4	39	34.5	39	—
Condylbasal length	—	36.2	42.2	37.2	37.8	33.1	38.4	35.2
Condyl-incisive length	—	—	—	—	—	—	—	—
Condylbasilar length	—	—	—	—	—	—	—	—
Occipitonasal length	—	—	—	—	—	—	—	—
Basal length	—	34.1	40.0	35.1	35.5	31.0	35.8	33
Basilar length	—	—	—	—	—	—	—	—
Zygomatic breadth	19.2	19	21.7	18.9	19.7	17.2	21.3	18.3
Interorbital breadth	4.9	5.3	5.3	5.1	5.0	4.8	5.5	4.7
Interparietal	—	9.6	10.7	10.0	9.3	8.0	10.0	9.3
Breadth braincase	15.5	15.0	15.9	15.5	15.2	14.9	16.8	14.8
Mastoid breadth	—	14.0	14.8	13.6	14.2	12.8	14.5	—
Nasals, length	14.0	13.2	15.9	13.5	14.4	12.2	14.0	—
Nasals, greatest breadth	4.0	4.3	5.2	4.4	4.2	4.1	4.5	4.3
Zygomatic plate	—	3.6	4.5	4.2	4.8	3.3	4.3	4.1
Diastema	—	—	—	—	—	—	—	—
Height muzzle behind inc.	—	—	—	—	—	—	—	—
Palatilar length	—	—	—	—	—	—	—	—
Palatal length	—	20.1	23.6	21.4	21.7	18.9	21.7	19.9
Incisive foramina, length	7.6	7.9	8.9	8.3	8.3	7.2	8.5	7.1
Incisive foramina, width	2.7	2.1	2.5	2.4	2.1	2.0	2.1	1.9
Breadth meso-pt. fossa	—	—	—	—	—	—	—	—
Width inside m ¹ -m ¹	—	3.6	4.5	4.1	3.1	3.3	3.3	3.2
Length bulla	9.2	7.7	8.5	8.0	7.8	7.5	7.9	6.6
Crowns m ¹⁻³	6.2	6.8	6.9	6.8	6.9	6.8	7.7	6.3
Alveoli m ¹⁻³	—	7.4	7.9	7.2	7.7	7.0	8.2	7.1
Crowns m ¹⁻²	—	5.3	5.2	5.4	5.3	5.5	6.0	4.9
m ¹ , length	—	3.4	3.3	3.5	3.3	3.4	4.1	3.0
m ¹ , breadth	2.1	2.3	2.2	2.4	2.3	2.3	2.7	2.0
m ² , length	—	2.0	1.9	2.0	1.8	2.0	2.0	1.9
m ² , breadth	—	2.1	2.0	2.2	2.2	2.1	2.5	2.0
m ³ , length	—	1.5	1.6	1.4	1.5	1.5	1.7	1.5
m ³ , breadth	—	1.6	1.5	1.7	1.6	1.7	1.8	1.5

<i>Rattus gestri-villosissimus</i> Group	<i>Rattus v. villosissimus</i> B.M. No. 6.3.9.30, ad. ♂ Alroy, N. Terr.	<i>Rattus v. villosissimus</i> A.M.N.H. No. 153476, ad. ♂ Birdsville area	<i>Rattus v. villosissimus</i> A.M.N.H. No. 153475, ♀ Birdsville area, S. W. Queensland	<i>Rattus v. profusus</i> , type B.M. No. 41.1262, ad. ♂
Head and body	195	187	184	180
Tail	160	169	140	—
Hind foot (s.u.)	36	36	—	33
Hind foot (c.u.)	39	39	33.5	35
Ear	—	22	20	—
Skull: total length	—	40	40.7	—
Condylbasal length	44.5	39.7	40	—
Condyl-incisive length	—	—	—	—
Condylbasilar length	—	—	—	—
Occipitonasal length	—	—	—	—
Basal length	41.8	37.4	37.5	—
Basilar length	—	—	—	—
Zygomatic breadth	22.4	20.6	20.8	±22
Interorbital breadth	5.2	5.0	5.1	5.0
Interparietal	10	10	9.3	10.2
Breadth braincase	16.7	16	16.3	15.7
Mastoid breadth	15	14.7	13.7	—
Nasals, length	—	14.5	14.9	14.3
Nasals, greatest breadth	4.4	4.2	4.2	4.5
Zygomatic plate	5.3	4.6	5.1	5.1
Diastema	—	—	—	—
Height muzzle behind inc.	—	—	—	—
Palatilar length	—	—	—	—
Palatal length	24.4	22.0	22.1	—
Incisive foramina, length	9.8	8.8	8.9	8.0
Incisive foramina, width	2.3	2.0	2.4	1.7
Breadth meso-pter. fossa	—	—	—	—
Width inside m ¹ -m ¹	3.9	3.9	3.4	3.1
Length bulla	9.0	8.6	8.4	—
Crowns m ¹⁻³	7.9	7.3	7.6	7.4
Alveoli m ¹⁻³	8.5	7.9	8.4	8.0
Crowns m ¹⁻²	5.6	5.5	5.9	5.7
m ¹ , length	3.8	3.7	3.6	3.7
m ¹ , breadth	2.4	2.4	2.5	2.4
m ² , length	2.0	1.9	2.1	2.0
m ² , breadth	2.2	2.3	2.3	2.4
m ³ , length	1.8	1.8	1.8	1.7
m ³ , breadth	1.7	1.8	1.8	1.9

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GAZETTEER

- Adele Island, Collier Bay, near Derby, Western Australia
- Admiralty Island, 300 miles north of Huon Peninsula, New Guinea
- Aitape District, longitude 142°30' E., north New Guinea
- Albany Island, off Somerset, Cape York Peninsula
- Albert (Lake), latitude 35°36' S., longitude 139°23' E., southeast of Adelaide
- Albert Edward (Mt.), Owen Stanley Range, east New Guinea
- Alexandria, latitude 19° S., Northern Territory
- Alice Springs, latitude 25° S., central Australia
- Alkmaar, Lorentz River, southern Netherlands New Guinea
- Alligator Rivers, East and South, Northern Territory
- Alroy, 40 miles west of Alexandria, Northern Territory
- Amberbaki, Vogelkop, western Netherlands New Guinea
- Angabunga River, Central Division, Papua
- Angellala, longitude 147° E., south Queensland
- Anggi Guyi Mountains, near Manokwari, Vogelkop, west New Guinea
- Annan River, Cooktown, Cape York Peninsula
- Aola, Guadalcanar, Solomon Islands
- Aramia River, north of the mouth of the Fly River, Western Division, Papua
- Archer River, latitude 13° S., Cape York Peninsula
- Arafak Mountains, Vogelkop, western Netherlands New Guinea
- Aroa River, Central Division, Papua
- Arthur River, northwest Tasmania
- Astrolabe Range, Central Division, Papua
- Atherton Tableland, latitude 17° S., northeast Queensland
- Avera, Aroa River (not found, possibly a misspelling of Haveri)
- Ayr, 50 miles southeast of Townsville, Queensland
- Babinda Creek, 20 miles south of Cairns, northeast Queensland
- Bainings, Balayang, northeast New Britain
- Baiyanka, longitude 145° E., Purari-Ramu Divide, eastern New Guinea
- Balayang, Wide Bay, northeast New Britain
- Balim River, longitude 139° E., Snow Mountains area, Netherlands New Guinea
- Banks Island (see Moa Island)
- Bara-bara, Milne Bay, eastern tip of New Guinea
- Barcarolle Station, longitude 144° E., 135 miles south of Longreach, central Queensland
- Barcoo River, tributary of Cooper's Creek, which flows to Lake Eyre
- Baroka, Mekeo District, Central Division, Papua
- Barrine (Lake), Atherton Tableland, northeast Queensland
- Barron Waters, Barron River, Cairns, northeast Queensland
- Barrow Creek, latitude 22° S., central Australia
- Barrow Island, latitude 21° S., northwest Western Australia
- Baruari (a rest house at 1600 feet), Astrolabe Range, Central Division, Papua
- Basedow Range, latitude 25° S., central Australia
- Bat Island, Purdy group, 70 miles south of Admiralty Islands
- Batavia River, latitudes 13° to 14° S., Cape York Peninsula
- Bele River, longitude 149° E., north and east of Mt. Wilhelmina, Netherlands New Guinea
- Bellenden Ker (Mt.), latitude 17°30' S., northeast Queensland
- Bernhard Camp, longitude 139°15' E., south side of Idenburg River, northern Netherlands New Guinea
- Bernier Island, Shark's Bay, latitude 25° S., Western Australia
- Beverley, East Pool, Western Australia
- Biak Island, Geelvinck Bay, Netherlands New Guinea
- Bioto, Mekeo District, Central Division, Papua
- Birchmore Lagoon, Kangaroo Island, South Australia
- Birdsville, southwest Queensland
- Biro, Apsley Strait, Melville Island, Northern Territory
- Bitokari, New Britain
- Black Mountain, 20 miles south of Cooktown, Cape York Peninsula
- Black River, tributary of Palmer River, north of Western Division, Papua
- Bloomfield River, between Cooktown and Cairns, northeast Queensland
- Boonbarilba Range, 85 miles from Laidley's Pond, Darling River, South Australia
- Bou, Milne Bay, eastern tip of New Guinea
- Bougainville Island, Solomon Islands
- Bouin (see Buin)
- Boulia, latitude 23° S., Western Australia
- Bramble Cay (island), at the mouth of Fly River, south Papua
- Brown River, Central Division, Papua
- Brown's Creek, latitude 13° S., tributary of Pascoe River, Cape York Peninsula
- Bugi, mouth of Wassi Kussa, south coast, Western Division, Papua
- Buin, south coast, Bougainville Island, Solomon Islands
- Bulung River, Saruwaged Mountains, Huon Peninsula, New Guinea

- Buna, Northern Division, Papua
 Bundaberg, latitude 25° S., southern Queensland
 Buntibasa District, Krätke Mountains, north New Guinea
 Bunya Mountains, longitude 152° E., latitude 27° S., northern Queensland
 Burdekin River, latitude 20° S., near Townsville, Queensland
 Burketown, southern tip of Gulf of Carpentaria, north Queensland
 Byfield, northeast of Rockhampton, east coast of Queensland
 Cairns, latitude 17° S., northeast Queensland
 Camp Oven Pocket, McIlwraith Range, Cape York Peninsula
 Cape Grenville, latitude 12° S., east coast of Cape York Peninsula
 Cape York, tip of Cape York Peninsula
 Cardwell, latitude 18° S., east coast of Cape York Peninsula
 Charleville, longitude 146°30' E., south Queensland
 Charlotte Waters, latitude 26° S., central Australia
 Clarence River, latitude 29°30' S., northeast New South Wales
 Claudie River, latitude 13° S., Cape York Peninsula
 Clermont, longitude 147°30' E., west of Rockhampton, central Queensland
 Clohesy River, Barron River, Cairns, north Queensland
 Cloncurry, latitude 21° S., longitude 140°30' E., Queensland
 Coen, latitude 14° S., Cape York Peninsula
 Cooktown, latitude 16° S., Cape York Peninsula
 Coombe, latitude 35°40' S., longitude 140° E., South Australia
 Crombie (Mt.), near MacDonnell Range, central Australia
 Cyclops Mountains, longitude 140°30' E., north New Guinea
 Dafonsero (Mt.), Cyclops Mountains, north New Guinea
 D'Albertis Junction, confluence of Alice and Fly rivers, New Guinea
 Danbullan, Atherton Tableland, north Queensland
 Darling Downs, longitudes 150°-151° E., latitudes 27°-28° S., south Queensland
 Darling River, New South Wales
 Daru Island, mouth of the Fly River, Western Division, Papua
 Darwin, longitude 131° E., Northern Territory
 Daviumbu (Lake), Fly River, near junction of Strickland River, Western Division, Papua
 D'Entrecasteaux, Straits of, Tasmania
 Derby, latitude 17°30' S., Kimberley Division, Western Australia
 Derimapa, Gebroeders, west Netherlands New Guinea
 Diamantina River, west Queensland
 Dickaree, Birdsville, southwest Queensland
 Dinawa, Owen Stanley Range, eastern New Guinea
 Dinner Creek, near Ravenshoe, Atherton Tableland, northern Queensland
 Dobo, Aru Islands, southwest of New Guinea
 Dobodura, Northern Division, Papua
 Dogwa, Oriomo River, southern Western Division, Papua
 Doreh (or Manokwari), Vogelkop, western New Guinea
 Dormanpad, 2400 meters above sea level, south of Idenburg River, northern New Guinea
 Doromena, Cyclops Mountains, north New Guinea
 Duaringa, southwest of Rockhampton, central Queensland
 Duck Creek, Macquarie River, latitude 31°40' S., longitude 147°40' E., New South Wales
 Duke of York Island, between New Britain and New Ireland, Bismarck Archipelago
 Dunk Island, latitude 17°30' S., north Queensland
 East Alligator River, longitude 133° E., Northern Territory
 East Pool, 50 miles east of Perth, Western Australia
 East Wallaby Island, Abrolhos group, latitude 28°30' S., Western Australia
 Ebor, latitude 30°30' S., northeast New South Wales
 Efogi, Brown River, Central Division, Papua
 Emirau Island, longitude 150° E., Bismarck Archipelago
 Evelyn, Atherton Tableland, north Queensland
 Eyre (Lake), South Australia
 Eyre Peninsula, South Australia
 Fergusson Island, D'Entrecasteaux group, east of New Guinea
 Finke River, latitude 25° S., central Australia
 Finnegan (Mt.), 30 miles south of Cooktown, Cape York Peninsula
 Finschhafen, east tip of Huon Peninsula, northeast New Guinea
 Fitzroy River, Rockhampton, central Queensland
 Fleurian Peninsula, South Australia
 Franklin Island, Nuyt's Archipelago, South Australia
 Fyfe Bay, near Samarai, east New Guinea
 Gaima, north side of the lower Fly River, Papua
 Gambier (Mt.), longitude 140°30' E., South Australia
 Gawa Island, between Trobriand group and Woodlark Island

- Gayata (Mt.), Richardson Range, eastern part of Owen Stanley Range, Papua
- Gebroeders, Weyland Range, west Netherlands New Guinea
- Geelvinck Bay, west Netherlands New Guinea
- Gerekanumu, Astrolabe Mountains, Papua
- Gippsland, southeast Victoria
- Gira River, latitudes 8°–9° S., longitudes 147°–148° E., Northern Division, Papua
- Glen Fernleigh, near Ebor, northeast New South Wales
- Glenelg River, southwest Victoria
- Gloucester, 60 miles north of Newcastle, New South Wales
- Goodenough Island, D'Entrecasteaux group, east of New Guinea
- Grenville (Cape), latitude 12° S., Cape York Peninsula
- Groote Eylandt, in the Gulf of Carpentaria
- Guadalcanar (or Guadalcanal), Solomon Islands
- Gunung Daab, Kei Islands
- Guy Fawkes District, neighborhood of Clarence River, about latitude 30° S., northern New South Wales
- Gympie, 70 miles north of Brisbane, south Queensland
- Habbema (Lake), north of Mt. Wilhelmina, Netherlands New Guinea
- Hagen (Mt.), longitude 143° E., central New Guinea
- Hart Range, near Alice Springs, latitude 23° S., central Australia
- Haveri, Astrolabe Range, Central Division, Papua
- Hayman Island, latitude 20° S., Whitsunday group, north Queensland
- Helenvale, 20 miles south of Cooktown, northern Queensland
- Henbury, Finke River, central Australia
- Herberton Range, Atherton Tableland, northeast Queensland
- Hermannsburg Mission, central Australia
- Hermit Hill, south of Daly River, longitude 130°30' E., Northern Territory
- Hinchinbrook Island, latitude 18° S., north Queensland
- Hollandia, longitude 141° E., north New Guinea
- Holmicote Bay, longitude 148°30' E., near Buna, Northern Division, Papua
- Hunstein Mountains, middle Sepik area, north Netherlands New Guinea
- Hunter River, Newcastle, latitude 33° S., northeast New South Wales
- Idenburg River, north Netherlands New Guinea
- Imbil, near Gympie, south Queensland
- Ingham, 60 miles northwest of Townsville, north Queensland
- Inkerman (Mt.), latitude 19°05' S., southeast of Townsville, north Queensland
- Iowma, north of Buna, Northern Division, Papua
- Iron Range, latitude 13° S., Cape York Peninsula
- Isa (Mt.), longitude 140° E., northwest Queensland
- Itiki, Astrolabe Mountains, Central Division, Papua
- Japen Island, Geelvinck Bay, Netherlands New Guinea
- Julatten, latitude 16°30' S., 10 miles west of Mossman, north of Cairns, north Queensland
- Kagi, 5000 feet above sea level, longitude 147°40' E., Central Range, Moresby-Kokoda track
- Kangaroo Island, South Australia
- Kapa Kapa, mouth of the Kemp Welch River, Central Division, Papua
- Karumba (see Kimberley)
- Katau, lower Fly River, Western Division, Papua
- Kemp Welch River, Astrolabe area, Central Division, Papua
- Kimberley (now known as Karumba), 10 to 20 miles northwest of Normanton, Queensland
- King River, Western Australia
- Kingscote, Kangaroo Island, South Australia
- Kokebagu, near Rigo, Central Division, Papua
- Kokoda, Northern Division, Papua
- Kosciusko (Mt.), south New South Wales
- Krätke Mountains, longitude 146° E., north New Guinea
- Kulungtufu, Saruwaged, west Netherlands New Guinea
- Kunupi Mountain, western Netherlands New Guinea
- Lagrange Bay, 150 miles west-southwest of Derby, north Western Australia
- Laidley's Pond, Darling River, latitude 32°45' S., longitude 142° E., South Australia
- Lamington (Mt.), near Morobe, Northern Division, Papua
- Laura, 50 miles west of Cooktown, north Queensland
- Lawn Hill Creek, Burketown, north Queensland
- Lewis Island, Dampier Archipelago, longitude 117° E., north Western Australia
- Liroeng, Talaud Islands, 400 miles northwest of New Guinea
- Liverpool Plains, latitude 31°10' S., longitude 150° E., New South Wales
- Lankelly Scrub, latitude 13° S., head of Coen River, Cape York Peninsula
- Lockerbie, latitude 11° S., 8 miles west-southwest of Somerset, Cape York Peninsula
- Longreach, longitude 144° E., central Queensland
- Lorentz River, south coast of Netherlands New Guinea at longitude 138° E.
- Mabaduane, longitude 143° E., south coast of Western Division, Papua

- Mabion (Mt.), Central Range, headwaters of the Fly River
 Macdonald River, northeast New South Wales
 MacDonnell Range, latitude 23° S., central Australia
 McIlwraith Range, latitude 14° S., Cape York Peninsula
 Mackay, latitude 21° S., east Queensland
 Madeu, upper Angabunga River, Central Division, Papua
 Mafulu, tributary of Angabunga River
 Mambaré River, longitude 148° E., Northern Division, Papua
 Mamberano River, formed by junction of Raufaer and Idenburg rivers, northeast Netherlands New Guinea
 Manokwari, longitude 134° E., Vogelkop, Netherlands New Guinea
 Manusela (Mt.), Ceram, Molucca Islands
 Margaret River, latitude 34° S., southwest Western Australia
 Marienburg, middle Sepik River, north New Guinea
 Mary River, 40 miles east of Darwin, Northern Territory
 Matsika, Angabunga River, Central Division, Papua
 Mekeo District, Central Division, Papua
 Melrose, latitude 32°45' S., Spencer Gulf, South Australia
 Melville Island, Northern Territory
 Merauke, longitude 40°30' E., southwest New Guinea
 Mermaid Strait, Roeburne, northwest Western Australia
 Millaa Millaa, Atherton Tableland, north Queensland
 Milne Bay, eastern tip of New Guinea
 Milton, 130 miles south of Sydney, New South Wales
 Mimika River, longitude 136°30' E., southwest Netherlands New Guinea
 Minnie Downs, northeast corner of South Australia
 Mirabooka, south of Charleville, longitude 146°30' E., south Queensland
 Misim (Mt.), near Morobe, Northern Division, Papua
 Moa (or Banks) Island, off the tip of Cape York Peninsula
 Mondrain Island, Recherche group, southern coast, Western Australia
 Moore's River, Victoria Plains, latitude 31° S., Western Australia
 Morehead River, longitude 141°30' E., south coast, Western Division, Papua
 Moreton Island, off the mouth of Brisbane River, south Queensland
 Morobe, Northern Division, Papua
 Moroka, Astrolabe Range, Central Division, Papua
 Moseley's Ranch, near Ebor, northeast New South Wales
 Mosquito Island, Hunter River, northeast New South Wales
 Mossman Gorge, 25 miles north of Cooktown, northeast Queensland
 Mulka, southeast of Lake Eyre, South Australia
 Murray Island, longitude 144° E., Torres Strait
 Murray River, border of New South Wales and Victoria
 Murrumbidgee River, southern New South Wales
 Musgrave (Mt.), Owen Stanley Range, east New Guinea
 Musgrave Range, central Australia
 Musgrave Telegraph Station, latitude 15° S., Cape York Peninsula
 Namoi River, longitudes 148°–150° E., latitude 30° S., west central New South Wales
 Nellie Creek, near South Alligator River, Northern Territory
 Nesbit River, McIlwraith Range, Cape York Peninsula
 New Britain, Bismarck Archipelago, northeast of New Guinea
 New Ireland, Bismarck Archipelago, northeast of New Guinea
 Newcastle Bay, latitude 11° S., northern tip of Cape York Peninsula
 Noord River, longitude 138° E., south Netherlands New Guinea
 Nullarbor Plains, southwest South Australia
 Oakey Creek, Darling Downs, south Queensland
 Ogeramngang, Saruwaged Mountains, northeast New Guinea
 Old Mawatta, south of mouth of Fly River, south Western Division, Papua
 Ooldea, longitude 132° E., Trans-Australian Railway, South Australia
 Oriomo River, south of mouth of Fly River, south Western Division, Papua
 Oroville Camp, middle upper Fly River, Western Division, Papua
 Otway Forest, southwest of Melbourne, Victoria
 Owen Stanley Range, eastern New Guinea
 Owgarra, Angabunga River, Central Division, Papua
 Owi Island, longitude 145° E., eastern Schouten group, off Sepik River, north New Guinea
 Padang (Camp), Mt. Karstens, Charles Louis Mountains, Netherlands New Guinea
 Palm Island, latitude 18° S., east coast of Queensland
 Palmer Junction, at confluence of Palmer and Fly rivers

- Palmer River, latitude 6° S., Fly River, Western Division, Papua
Paluma Range, 20 miles west of Townsville, north Queensland
Parry's Creek, eastern Kimberley Division, north Western Australia
Pascoe River, latitude 12°30' S., Cape York Peninsula
Peach River, tributary of Archer River, Cape York Peninsula
Pearson Island, Investigator group, longitude 134° E., South Australia
Pemberton, latitude 34° S., longitude 116° E., southwest Western Australia
Peron's Peninsula, latitude 26° S., Shark's Bay, Western Australia
Perth, latitude 32° S., Western Australia
Piara, 4 miles northwest of Somerset, Cape York Peninsula
Pionier Bivak, Mamberano River, north New Guinea
Point Lookout Gorge, near Ebor, northeast New South Wales
Port Essington, northeast of Darwin, Northern Territory
Port Lincoln, South Australia
Port Moresby, Central Division, Papua
Port Stewart, latitude 14° S., Cape York Peninsula
Portland, longitude 142° E., Victoria
Portland Roads, latitude 12°30' S., Cape York Peninsula
Prauven Bivak, Idenburg River, north New Guinea
Quamby, 25 miles northwest of Cloncurry, Queensland
Ramu River, longitudes 145°-146° E., latitudes 4°-6° S., north New Guinea
Ravenshoe, Atherton Tableland, northeast Queensland
Rawlinna, Trans-Australian Railway, 235 miles east of Kalgoorlie, West Australia
Rawlinson Mountains, Saruwaged, northeast New Guinea
Red Island Point, near Lockerbie, north tip of Cape York Peninsula
Reedy Creek, Central Australia
Rennell Island, Solomon Islands
Resi Camp, at 900 meters elevation on Lorentz River, south Netherlands New Guinea
Richmond River, latitude 29° S., northeast New South Wales
Rifle Creek, near Mt. Isa, northwest Queensland
Rigo, mouth of the Kemp Welch River, Central Division, Papua
Rockhampton, latitude 23° S., central Queensland
Rocky Scrub, McIlwraith Range, Cape York Peninsula
Roeburne, longitude 117° E., northwest Western Australia
Rona Falls, Astrolabe Range, Central Division, Papua
Roseberth, 25 miles north of Birdsville, southwest Queensland
Rossel Island, D'Entrecasteaux group, east of New Guinea
Russell River, 25 miles south of Cairns, north Queensland
Salawatti, northwest of Vogelkop, west New Guinea
Sansapor, north Vogelkop, west New Guinea
Santa Ysabel (Island), Solomon Islands
Saruwaged Mountains, Huon Peninsula, New Guinea
Sattelberg, Huon Peninsula, New Guinea
Scratchley (Mt.), Owen Stanley Range, east New Guinea
Seagren's Farm, Kilometer 10, Cooktown-Laura Railway, northern Queensland
Sentani Lake, Hollandia, north Netherlands New Guinea
Sepik River, north New Guinea
Setakwa River, longitude 137°30' E., northeast Netherlands New Guinea
Sevia, Huon Peninsula, Netherlands New Guinea
Shepherd's Battery, upper Peach River, McIlwraith Range, Cape York Peninsula
Shipton's Flat, 30 miles south of Cooktown, Queensland
Skull Creek, extreme north (west side) of Cape York Peninsula
Snow Mountains, Netherlands New Guinea
Sogeri, Astrolabe Range, Central Division, Papua
Somerset, north tip of Cape York Peninsula
Sorong, west Vogelkop, west New Guinea
South Alligator River, longitude 132° E., Northern Territory
Speck (Mt.), 20 miles west of Townsville, north Queensland
Speewah, upper Clohesy River, Cairns, northwest Queensland
Spurgeon (Mt.), 30 miles north-northwest of Atherton Tableland, northeast Queensland
Stradbroke Island, off Brisbane, south Queensland
Strickland River, main tributary of Fly River, Netherlands New Guinea
Sturt Island Camp, near Fairfax Island, lower Fly River, west Papua
Sumuri Mountain, west Netherlands New Guinea
Swan River, Perth, Western Australia
Tafa (Mt.), Central Division, Papua
Talaud (Talaud) Islands, 200 miles north of the Molucca Islands

- Tamata, Mambaré River, Northern Division, Papua
 Tambellup, 60 miles north of Albany, longitude 118° E., southwest Western Australia
 Tarara, Wassi Kussa River, south coast, Western Division, Papua
 Tea-Tree Well, latitude 22° S., central Australia
 Teloeti Bay, Ceram, Molucca Islands
 Tennant's Creek, latitude 19°30' S., Queensland
 Tolga, Atherton Tableland, north Queensland
 Tombioki, Arfak Mountains, west Netherlands New Guinea
 Toolbrunup, southwest Western Australia
 Townsville, latitude 19°30' S., Queensland
 Tozer (Mt.), latitude 12°30' S., Cape York Peninsula
 Turton's Pass, Otway Forest, Victoria
 Ugi Island, north of San Cristobal, Solomon Islands
 Utakwa River, longitude 137°30' E., southwest Netherlands New Guinea
 Van Weil's Camp, junction of Reiger and Lorentz rivers, south Netherlands New Guinea
 Victoria River, 400 miles west of Alexandria, Northern Territory
 Victoria River (or Barcoo or Cooper's Creek), western Queensland
 Vine Creek, Atherton Tableland, northeast Queensland
 Vogelkop, western part of New Guinea
 Waghi River, headwaters of Purari River, Gulf of Papua
 Waigeu Island, northwest of New Guinea
 Walter Hill Range, east spur of Atherton Tableland, north Queensland
 Wandandian, Jervis Bay, 100 miles south of Sydney, New South Wales
 Wantapellya, longitude 142°30' E., latitude 32°26' S., central Australia
 Warrego River, longitude 146° E., south Queensland
 Wasior, Wondammen Peninsula, latitude 2°45' S., west side of Geelvinck Bay, west New Guinea
 Wassi Kussa (River), longitude 142° E., Torres Strait, south coast of Papua
 Wenlock, latitude 13° S., Batavia River, Cape York Peninsula
 Weri, Kei Island, southwest of New Guinea
 Weyland Range, west Netherlands New Guinea
 Whitewater Camp, Kapari River, longitude 148°20' E., east of Kemp Welch River, Central Division, Papua
 Whitsunday Islands, latitude 20° S., north Queensland
 Wide Bay, longitude 152° E., New Britain
 Wilhelmina (Mt.), longitude 138°45' E., Netherlands New Guinea
 Winton, longitude 143° E., central Queensland
 Wokan, Aru Islands
 Wongabel, Atherton Tableland, north Queensland
 Woyaline, east Pingelly, southwest Western Australia
 Wuroi, near Oriomo River, south Western Division, Papua
 Wyndham, longitude 128° E., north Western Australia
 Wycliffe Creek, latitude 21° S., central Australia

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